RIG

Remote Imaging Group
JOURNAL

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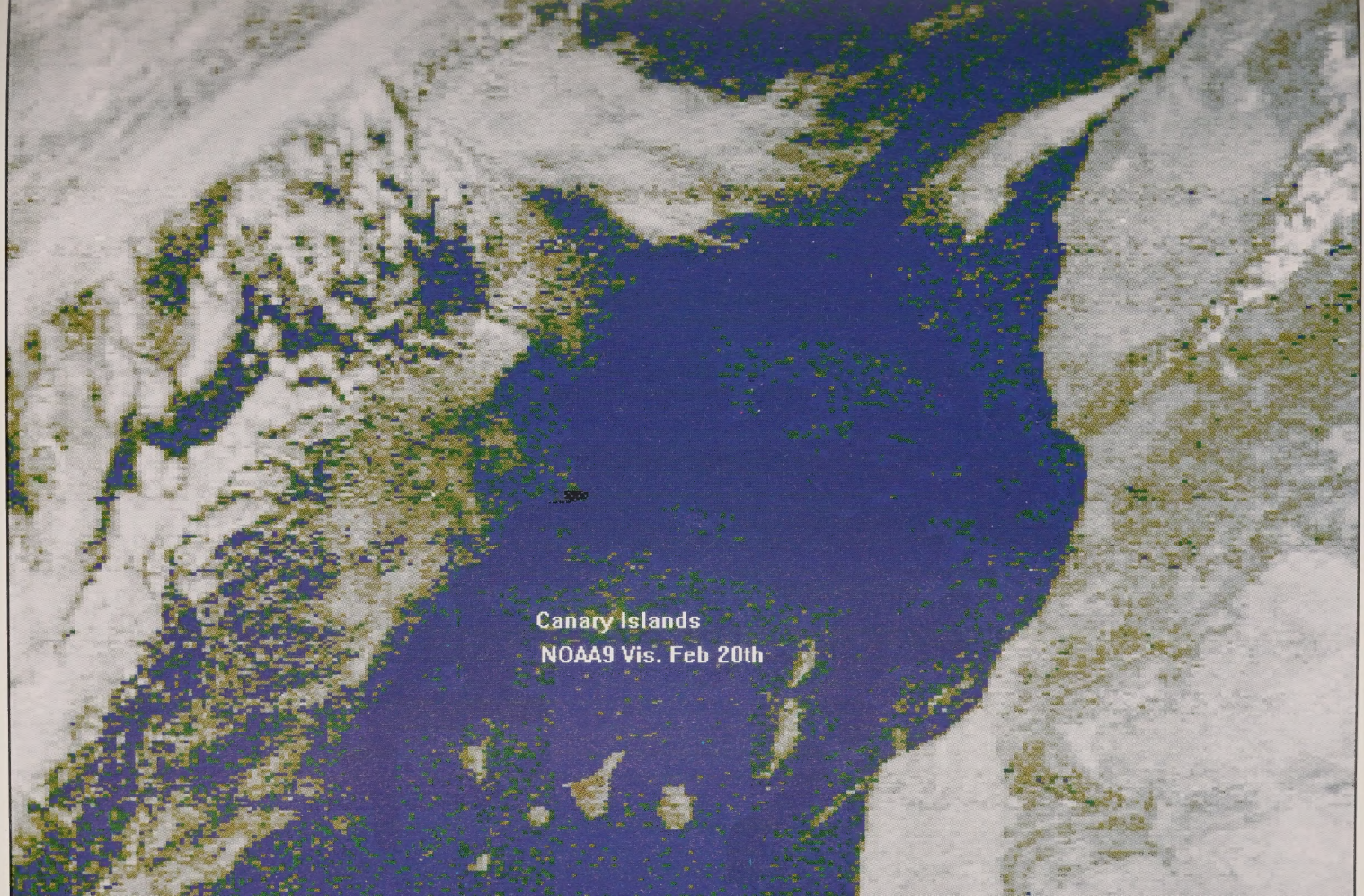
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Centre pages: Predictions courtesy Simon Goodall

REMOTE IMAGING GROUP — OFFICERS 1994

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CHAIRMAN'S WAFFLE

HENRY NEALE

Earlier this year we were in a small town called Bursford and we visited its church. I was somewhat taken aback to find in the North Aisle that my namesake from many a year ago (and he spelt his name exactly the same as mine) was a Bellfounder. There was Henry Neale mentioned several times - his many deeds and even his less successful ones. Of the four bells he cast, only two were any good! Things don't change much and I often only achieve a fifty percent success rate! Well I can claim (with the help of many others) the success of RIG. The WMO admitted that with the use of the RIG membership list (the ones who did not object to being advised to the WMO) they had doubled the number of weather satellite interested stations in the world on their books! At least with our help we have improved the statistics and are now becoming recognised as an organisation. It was also very reassuring to hear from other officials at the Frank Bell (Royal Grammar School, Guildford) event that we were also recognised as being an authoritative organisation. Again there could be more in later editions. RIG is here to represent you to the authorities (well in the UK anyway and further afield if possible) and try and improve the weather satellite enthusiast's lot.

The Electronic Bulletin Board has had another crash. This time I was a little more adept at recovering as many files as possible and nearly recovered them all. The only part I didn't succeed in recovering was the initiation rites part. Those who registered between mid October 1993 and mid April 1994 will have to go through the procedure again. I saved the files but unfortunately it was in two parts and I was not able to splice them together successfully. All the data was there with a small overlap but I just couldn't get the superglue in the right place. I gave all new initiates a security level that was the standard level and you can download immediately. It has become apparent that a more recent version of Remote Access will allow better initiation strings and hence more successful connections. I've heard that before but it cannot do any harm to try! To cap it all - British Telecom are changing the area codes in October 1994. We go digital then and hopefully all those noisy lines will disappear into the North Sea! Someone has complained about the snow being on the opening screen long after winter has gone but they don't know how difficult it is to draw a fresh scene. It is another one of those jobs that I will get around to - one day, but I must get the ***** thing working first! All these breakdowns are doing a wonderful job in teaching me about all the simple things in computers, like why won't two IDE drives talk to one another when they are in the same PC! It is only when you have to think of alternative ways of doing the same job without shorting everything out that the complexity of modern day computing really hits you.

We are now getting well into the Rally season but it is becoming rather more than a bit of a chore. I think that my total for 1994 will be about 14 and some of them are really double booked - ie Stafford on at the same time as York. We will do our best but I don't think that there will be much further expansion in this direction unless they are well separated. I did 290 miles to get to the Guildford event on the Saturday, followed by 191 miles on the Sunday, doing the BATC at Coventry Rally. I was really knackered after that and then the management said that they wanted the chimney sweeping on May Day Monday - just when I thought I could catch up on the resting part! Whilst on the subject of Rallies, and in connection with goods ordered on the phone for collection at a rally, please note that we will only reserve goods until 1pm. After that time we will sell to the first member with the money in his hand!

On the stock side of things there is now the John Hibbert Quad Loop Yagi available from RIG at £80. This has been a popular line and John (now separated from TH2) has standardised on the 47-element version to give you that bit of extra gain and directivity. This fits in with a small rearrangement of TH2 who are concentrating on the software/interface side. John is making the Quad Loop Yagis in batches for us and we will try and keep a stock in for your requirements. He has also produced an interface box for connecting your PROscan receivers and crossed dipoles and downconverters to, so that you can switch between them and also apply 12 volts up the cable to the downconverter. We haven't tested this box to destruction yet but no doubt there will be more on this in the future. We are also investigating a source of 5-element crossed Yagi's at the right price but I have no further news on that one at present - no doubt you will be hearing about it.

The latest update to PROsatII has a map outline overlay which can be added to polar-orbiter images. It takes a long while on slow machines but is much better on a 486 or a machine with maths co-processor. I understand that there are a few other transparent modifications but I haven't seen them! We often get asked where the Colour Animate section is, which is in the manual. The manual describes some of Timestep's products, but the Colour Animate is only available on the version that they sell at considerably higher prices. The manual also refers to a connecting cable that is NOT included in RIG's economically priced version. We are now producing these with sensible lengths of cable for £10. With all the equipment that RIG sells, please contact us first before going to the manufacturer with queries. We purchase goods at advantageous prices which we pass on to you. But you must go via us if you have a problem.

Well that's about it for this time - I must get the hacksaw out to the PC and do a harddiskoptomy and I bet that sent the spelling checker haywire!

Best wishes, Henry

FROM THE EDITOR'S DESK

PETER WAKELIN

Most of you received your copies of RIG 36 on time and almost 80 phoned or wrote with complimentary remarks on the first issue produced by Mark and me. Thanks to all of you. We both had a hectic time in the weeks prior to the printer's deadline but we learned a lot and our second one is proving to be much easier though there's still time for things to go wrong.

Quite a few RIG members were among the 200+ delegates at the exhibition and conference organised by Frank Bell at the Royal Grammar School in Guildford. Some went there to buy Meteosat and ERS imagery on CD-ROMs but unless they were there very early they were unlucky as demand far exceded supply. This is a rapidly expanding area and I am sure you will be reading a lot about CD-ROMs in these pages in the future. The June issue of Sky and Telescope dropped through my letterbox this morning and in large letters on page 1 is "The Entire Night Sky on CD-ROM". Thousands of images costing millions of dollars to obtain from the world's finest instruments that cost billions of dollars to develop and build are available in a set of 101 CD-ROMs for just $3,500!

There's no firm news to report on the encryption issue this time but encouraging noises have been heard coming from certain quarters. The crucial meeting of the EUMETSAT governing body takes place during June and we will give you more information in the next issue.

Those who pleaded for more home-construction articles should find enough in this issue to keep them busy until RIG 38 arrives. Will sun-glint from hundreds of aluminium squares on roof-tops be visible on satellite images I wonder? Amiga users are not forgotten in this issue. Mike Robinson tells us how satellites have changed his life and Michael Gill says we can't really see our visible images.

The image on the front cover came down from space on 27 April. It was a fine day in South Africa and not only weather-wise. It was the day a new flag was raised. It was the day our newspapers and TV screens were filled with images of smiling South Africans in marked contrast to the appalling images of violence in recent times. Let's hope that South Africa now slips out of the media headlines and the hopes and aspirations of millions of people are fulfilled. ●

FENG YUN 2A destroyed in explosion. One person killed, 31 injured. See page 64 for more details. ●

FROM THE TREASURER

Mark Clarke

The Group's annual accounts to 31 December have now been fully audited. Due to the early date of the AGM it was not possible to have the audited figures available then. Herewith are just a few comments on issues indicated in the accounts.

The deficit is not unduly worrying and principally arose from financial support for RIG's first conference in Daventry, increased bank charges and increased expenses in administering the Group. To maintain the Group's financial standing, subscriptions and RIG Shop Corner prices were reviewed and adjusted.

If any members wish any further information relating to any specific item would they kindly write to me.

RIG is looking for a NEW TREASURER.

It is with regret that due to the pressure of work and family commitments I have had to announce my resignation as the Group's treasurer. I will, however, be remaining on the committee at least until the next AGM.

If any person is interested in taking over the position of treasurer, and would like more information, would they kindly contact me as soon as possible, preferably before 30 June. As a guide I have listed below some criteria which would be useful. Ideally the person should be:

> Resident in the South East and able to attend committee meetings in the Welwyn Garden City or Rickmansworth areas every 6-8 weeks (normally on Saturday afternoons).
>
> Experienced in cash book accounting using Money Manager or similar PC-based software.
>
> Conversant with VAT (UK and EC) quarterly returns and credit card transactions.

Other tasks include invoicing, banking and handling all the Group's financial and insurance matters. A willingness to help at rallies would be appreciated.

I estimate that a minimum of 5 hours per week are needed, excluding time at meetings and rallies. PLEASE, PLEASE, if you might be willing to become the new treasurer, give me a ring to find out more.

REMOTE IMAGING GROUP

Income and Expenditure Account for the Year Ended 31 December 1993

Sales			64548
Subscriptions			10305
Advertising			1058
Donations			60
Conference Income			6208
			82179
Less: Opening Stock		8549	
Purchases		57716	
Closing Stock		(11479)	54786
			27393
Add: Bank Interest Received - Gross			288
			27681
Less: Conference Expenses		9477	
Equipment Repairs		585	
Advertising		240	
Management Charge		1537	
Newsletter Printing		8845	
Telephone		1350	
Postage and Stationery		6297	
Travelling Expenses		143	
Rally Expenses		472	
Software		227	
Insurance		500	
Subscription		14	
Bank Charges		1417	
Accountancy		325	
General Expenses		375	
Corporation Tax		72	31876
			(4195)
Less: Depreciation of Fixed Assets			1622
Deficit for the Year			£(5817)

REMOTE IMAGING GROUP

Balance Sheet as at 31 December 1993

ASSETS EMPLOYED	Balance 1/1/93	Addns	Depn	Balance 31/12/93
FIXED ASSETS				
Equipment	2888	1978	1622	3244
CURRENT ASSETS				
Stock			11479	
Debtors			1027	
Cash at Bank			7911	
Cash in Hand			1101	
			21518	
CURRENT LIABILITIES				
Creditors			1554	
Corporation Tax			72	
			1626	
NET CURRENT ASSETS				19892
				£23136
FINANCED BY				
CAPITAL ACCOUNT				
Balance 1 January 1993				28953
Deficit for the Year				(5817)
				£23136

REPORT of the AUDITORS to the MEMBERS of REMOTE IMAGING GROUP

We have audited the accounts on pages 1 and 2 in accordance with approved accounting standards, and we have carried out such procedures as we consider necessary.

In our opinion, the accounts, which have been prepared under the Historical Cost Convention, give a true and fair view of the state of the Club's affairs at 31 December 1993 and of the result for the year ended on that date.

Maurice Lake & Co
Accountants and
Taxation Consultants

47A High Street
Halstead
Essex
CO9 2JD

22 April 1994

REPORT OF THE 1994 AGM

Ray Godden

Minutes of the RIG AGM held on February 20th 1994

The meeting was opened by the Chairman, Henry Neale, at 10:30. There were 15 members present together with the Committee. Apologies for absence were received from Frank Bell, Chris Kaley and John Tellick.

Minutes of the 1993 AGM

These were agreed by the meeting to be signed by the Chairman.

Matters Arising

None.

Chairman's Report

Henry reported that although membership had increased during the year turnover due to sales of equipment was down. This was not entirely unwelcome as the load on some Committee members in 1992 was excessive.

He said that he was approaching his tenth year as Chairman and although he was not intending to stand down in the near future he would not hold the position indefinitely. Therefore consideration should be given to the appointment of a Vice Chairman as Chairman Designate, who would become familiar with the responsibilities involved.

The 1993 RIG conference had been a great success, however it had been decided inappropriate to hold one in 1994 - possibly in 1995. Rig had attended a number of rallies during the 1993 and this year an additional one, in Staffordshire, would be attended. Consideration was being given to RIG showing at the German Friederichshafen Hamfest at some time in the future.

Frank Bell had been co-opted to the Committee to pursue the encryption issue with government and other agencies. Frank has been very active in promoting the interests of RIG and of education in this matter. In April he is organising an Exhibition and Conference on Remote Imaging intended for those in education;

RIG members are welcome to attend. Details will be published in the Journal.

Secretary's Report

The Chairman said that unfortunately, due to illness, John Tellick was not present and could not therefore present his report. John had also been active in pursuing RIG's interests in encryption with various international organisations.

Treasurer's Report

Mark Clarke said he had in fact three roles: Treasurer, Advertising Manager and responsibility for the dissemination of the weekly RIG Bulletin via packet radio. The Advertising Manager function he had now relinquished to Michael Gill. There had been an interruption in the RIG packet service, due to failure of Mark's computer, but it was now resumed and was being extended to continental Europe. Many recipients are not members but it is regarded as good publicity. A number of radio amateurs had learned of RIG via packet and had subsequently joined the Group.

Regarding the 1993 financial results, due to the AGM being early this year they had not yet been fully audited. However a preliminary set of accounts was available which were believed to be accurate. They showed that in 1993 RIG had an actual loss of £4,159. There are two factors to explain this figure: the RIG Conference and the timing of subscription renewal. The conference had been subsidised to the extent of £3,482; this was very close to the budgeted figure of £3,500. As the subscription renewal form went out with the December Journal many members renewed before the year-end. The RIG financial year starts on January 1st and therefore there has been significant subscription income in one year relating to the next, which distorts the results. If this factor is taken into account 1993 would show a surplus of £126 and, if the conference loss is removed, the surplus would be £3608. Fully audited accounts will be published in RIG 37.

In 1993 sales of goods were down 21% on 1992. Expenses such as insurance, bank charges etc. had increased substantially and the total was 29% higher than 1992. The margins on sales of goods were not covering the costs involved and small price increases are being made to correct this.

Advertising in Short Wave Magazine, Practical Wireless and RadCom was continuing and there was a steady stream of enquiries followed by the joining of new members.

Membership Secretary's Report

Ray presented a table :-

Membership - February 20th 1994

	1992		1993		1994	
Paid-up	673	*61%	1035	*78%	1260	*71%
New	49	7%	89	9%	102	8%
Overseas	69	10%	154	15%	209	7%

(* % of previous year)

Year-end membership

1991	1992	1993	1994
1100	1300	1780	2000+ ?

All numbers had increased except for the percentage of the previous year of paid-up members at AGM time. This was undoubtedly partly due to the early date of the 1994 AGM but there could be an indication of a slight fall in renewals, perhaps due to the increase in price, but it was too early to be sure. New members were joining at a rate higher than last year and if trends are extrapolated we could be over 2,000 by the end of 1994.

A questioner from the floor asked about the implications of the increased membership on the Committee. It was said that obviously the workload had increased - more support was needed by new members - but the Committee was now larger and the load better distributed. Ray said that his own effort was greater as responding to enquiries and adding the details of new members to the data base consumed extra time - but none of us wanted to see our membership decreasing!

Another questioner asked if spreading renewals throughout the year instead having a peak at one period would help. The reply was that this had been considered but would complicate procedures and, since the period in question was during the winter when the evenings were long, it seemed the best way to operate.

Journal Editor's Report

Henry prefaced the Editor's report with some comments. The resignation of the Journal Team had been sudden and unexpected. If the publication of the Journal was not to be delayed replacements were urgently needed. He considered that the Editor should have a good background in remote imaging and should be

active in the field, receiving HRPT and PDUS as well as the low resolution modes. Peter Wakelin was an ideal candidate - he had recently retired - and Henry was very pleased when he accepted the post. Mark Pepper was approached for the post of Make-up Editor. He works in the printer industry and has experience in newsletter publishing. Thankfully Mark had also accepted. Tribute was due to James Brown and Mike Goodall for substantially raising the standard of the Journal during their period in office.

Peter said that his job had been made more difficult by having to cope with a change of printer. The new printer works to a slightly different format and size. In spite of this RIG 36 would be published next week, a little ahead of time. He had made some changes which he trusted would be regarded as improvements.

On reviewing past issues he found that about 50% of the content originated from the Committee. He made a strong plea for more contributions from the general membership. The comments made on the Activity Survey forms had been read by all the Committee and were very helpful. It is difficult to satisfy all - some comments are completely conflicting: e.g. some want the Journal printed in monochrome on cheaper paper and others want 12 A4 copies a year with more colour! As things were it is difficult to modify the balance of articles as virtually all copy submitted is published.

Peter stated that there are break points in the cost of printing so that unit cost falls as circulation increases.

Make-Up Editor's Report

Mark asked that material be submitted in computer format. This is more important for graphical content as Peter is prepared to re-type text.

Henry formally thanked Peter and Mark for taking their posts at short notice.

Rally & Exhibition Co-Ordinator's Report

Dave Cawley first made a comment about encryption. Only high resolution digital transmissions (PDUS) will be encrypted. Even these will include a "limited set of clear data", although is not known how frequent this will be.

The decision to reduce the number of rallies attended still applies. Dave confirmed that the German Hamfest was under consideration for next year, not this. There was at this point some discussion about the need to attend a northern rally and some suggestions were made.

Regarding the Conference, Dave said this had been extremely successful. He was somewhat disappointed, knowing how well the 1993 event had been received, by the number of people showing interest in a conference this year - only 60 replies being received.

Nominations for the 1994 Committee

No new nominations had been received. During the year Michael Gill, Frank Bell and Mark Pepper had been co-opted to the Committee. James Brown and Mike Goodall had resigned and Chris Kaley is not standing for re-election. The Chairman suggested that the present Committee be re-elected en bloc. This motion was proposed by Bev Marks and seconded by Brian Bush. It was carried on a show of hands, there being no objections.

Henry invited anyone present to offer themselves for election; no one did so.

Any Other Business

Henry asked the floor if there were any points they wished to make. There was some discussion about the glossy paper used in the Journal which some found unsatisfactory. Henry said that there had been a problem but that we should see how the next issue from the new printer turned out.

David James suggested that RIG should be promoted in the educational sphere. The reply was that a number of members were in education as was a Committee member, Frank Bell. There was concern about the amount of technical support that schools require and that RIG could be held liable for any associated injury or damage. However, some individuals had provided such support.

A member asked if RIG could hold a stock of books, or provide a bibliography, on the subject of remote imaging. Mark Clarke has an interest here but is looking for a person to help. The consensus was that stocking of books was best left to the booksellers but a bibliography is a good idea. Michael Gill has prepared an excellent index to all RIG Newsletters and Journals, the question is how to provide it - perhaps it could be included in the Journal a part at a time.

There was discussion about RIG supplying images on CD-ROM. RIG could re-sell disks from various sources. This is under consideration.

John Crosby stated that he had been a RIG member for two years, was a radio amateur and was also a member of 'COL' (Climatological Observation Link). Perhaps RIG should be promoted with COL, the members of which, not being

radio amateurs, were not aware of the possibility of direct reception of weather satellites. This stimulated an interested discussion. The issue of technical support was relevant here as in education. John Crosby offered to write an article about RIG for COL.

As it was 11:30 and there was no other business Henry closed the meeting. The floor thanked the Committee for all their efforts.

MEMBERS' ADVERTISEMENTS

Members may advertise surplus equipment etc. for sale in the Journal free of charge but subject to space being available. Advertisements should be concise and must be for goods relevant to RIG activities. They should be submitted to the Journal Editor and not the Advertising Manager.

FOR SALE DARTCOM receiver with LCD display cased with 2 Amp power supply (switched voltage for down-converter) Price £120.

DARTCOM receiver with LCD display in mini rack together with YU3UMV framestore and G8XTW board. No power supply but plenty of space in mini rack. Price £220. All the above equipment is fully working and tested together with full documentation. Cliff Goddard G4LAA, Fairfield, Newtown, IRTHINGTON, Cumbria, CA6 4PG

FOR SALE MICROWAVE MODULES MMG1691 METEOSAT PREAMP. Weatherproof box. Just serviced by Mutek Ltd. Instructions. £50 ono.

MICROWAVE MODULES DIGITAL FRAMESTORE. Complete with Yaesu YVM1 monitor, instructions. £100 ono

MITAC 387SX LAPTOP. Brand new, coprocessor, 4MB RAM, case, mouse, DOS6, WIN3.1, manuals. £700. G4JBH Yeovil 0935 28341

FOR SALE ICS Met2 SHF Weather Satellite Receiving/Demodulating system- Receiver, 32 element Yagi, HEMT preamplifier, Interface card for IBM compatible computer, Software for IBM, Atari and Amiga computers. Full resolution of Meteosat, from CGA to 1024x768x256 grey levels/colours with animation facilities. £475. Contact Peter 081 505 7207.

FOR SALE TAXAN 795 Multiscan 14" SVGA monitor with Trinitron tube. As new, boxed, cable, manual. £295 carriage extra.

TIMESTEP HRPT SYSTEM- Receiver, HEMT preamp, PC card and software. Offers around £700. Phone Paul, G4XHF 0293 515201 (home-evenings) or 0622 696437 (business-day).

HOW I BECAME A RIGLET.

Mike Robinson G7PQL

During the years 1979 to 1988 I suffered a series of unidentified illnesses. On the 18th of October 1988 I left work at Preston and travelled home. Whatever the illness was it was back with a vengeance that day. There followed three months of intensive medical checks which culminated in the specialists informing me that I would have to give up work. I was diagnosed as suffering from an endocrine disorder for which there was no cure. In October 1988 I was Norweb's Mid-Lancashire Area's Second Engineer, Telecommunications with 35 years service in the electricity supply industry with degrees in electronics and electrical engineering. In January 1989, at age 50, I was a pensioner thrown out to grass. 1989 dragged on, and on, and on.

In August 1990 the real facts hit me hard. I could either continue my electronics as a hobby or become brain dead. I sat and thought long and hard. Things were not really as bad as I had allowed myself to think. Financially I was secure and I still had my knowledge and experience. I still loved electronics and, most important of all, I had many days of reasonable health that could be used fruitfully, provided I was sensible. I climbed out of the pit of despair into which I had allowed myself to fall. I had the garage converted into a study and equipped it with computers and all things electronic. Life as I now know it had begun.

In 1992 I bought a Realistic Pro 2004 scanning radio. After listening to the commercial airliners for some weeks I started to scan around a little. On 137.620MHz I occasionally heard a funny "clip-clop" noise which I also located on 137.500MHz. Were these the fabled "Riders in the Sky" so beloved of the Country and Western singers or was it data? Tape recorders, spectrum analysers and oscilloscopes soon surrounded the inoffensive looking Pro 2004.

Eureka! It was data - but what did it do? Lady Luck now enters the scene. My wife arrived home with a copy of Shortwave Magazine - "I thought this might interest you" she said. "I'll have a look at it later as I'm busy trying to find out what this noise is all about". Later, while sitting in the garden having a cup of tea, I flicked through the magazine. Mmm! very interesting. Lots of far away AM stations to listen to. Ah! this air band HF frequency list looks interesting. Wow! weather fax on HF! Now, where's that Icom IC-R72 HF receiver. Hold on a minute. What's this Info in Orbit about? and these weather satellite pictures! Read on Michael, it looks good. I don't believe it! Lawrence Harris has found MY frequencies and HE knows what they are!

Ok, so far so good. There are weather charts on HF and weather pictures on VHF. I can hear them but not see them so what next? Hang on a minute. What

was that program I had on the computer? JVFAX or something? Oh! it needs an interface between the radio and computer. Out comes a 741 op amp, four diodes, two capacitors and a piece of breadboard. An hour later, in a tangle of wires, the computer is connected to the HF receiver. Now where's that Shortwave Magazine as I need a frequency. I hear what sounds like a wheel-barrow with a rusty wheel. No matter, this is the frontier of science and a little oil will soon put things to rights. Get in there and test the water. The worst thing that can happen is the gear will blow up!

Next day I get what looks like a weather chart on the screen. It's a bit ragged but we have the technology to make things better (I'm an optimist). An hour later, with a bit of tweaking of JVFAX, I get a WEATHER CHART for flight level 270 in pristine black and white. Phone calls to anyone who will listen to my bragging take up the next hour. The next few days produce all sorts of charts, none of which I understand.

HF is now being received loud and clear so let's see what I can do with those VHF signals. Disconnect the Icom and connect the PRO 2004 VHF receiver. Tune to 137.620MHz - nothing. Wait patiently - nothing. Have some lunch and wait - still nothing. I wonder if theve've been switched off? No, hang on, here it comes! Clip-clop, clip-clop. JVFAX running, VHF receiver running, computer normal - we have lift off! Drat, nothing on the screen and the signal's gone. What the heck are they playing at. It could not possibly be my fault.

Next day, armed with times from yesterday, I sit with all systems ready. Here she comes. Nothing, tweak JVFAX but still nothing so tweak again - wow! Something's there but the signal's fading fast. I wonder what Lawrence Harris was on about with those Kepler Element things. Day two of VHF work. All systems are go. Signals appear out of the blue and fifteen minutes later I have something on the screen. JVFAX needs tweaking for tomorrow.

Day three. System all A-OK. Signal heard and an image received. I think it was our black cat at midnight. Hang on, I have these signals recorded so switch brain on and input into JVFAX and tweak to my heart's content. A crude picture but the best yet. Almost there now so tomorrow I'm going to zap that sat!

Day four. Very hazy recollections of this day. I saw part of the UK from a satellite's viewpoint and immediately went into shock!

Thus began a fascinating hobby that has now taken over my life. I was totally hooked, not on the technology, but on the weather. An advertiser in RadCom was selling an ICS Met-1 system at a very low price. Now this was very interesting because it was geared to the geostationary satellites which I had not yet seen. So, with a promise to re-decorate the house, lay a path across the lawn

and have the drive re-surfaced, the senior operator gave permission for the item to be purchased. (I hope she doesn't read this!)

ICS Met-1 system arrives. Wife threatens divorce when she sees the parabolic dish and asks questions regarding my sanity. Totally ignoring this tirade I insert the card into the computer and prop the dish up in the middle of patio by a method I do not wish to discuss. Next, connect supplied cable to Met-1 and ignore wife who stands there with suitcase. Load software. Follow instructions. Adjust dish. Wife now in kitchen making lunch so she must love me after all. Re-check everything and switch on. Wow!!! We have lift off! A picture appears on the screen. I'm a weather man!! One problem though. I havn't a clue what I'm doing. Best thing to do is to show wife how clever I think I am. Get a reaction of "Mmm! very nice - lunch is ready". Had a very quiet lunch but it gave me a chance to think about what that new board in the computer could do. By 1500 hrs I had a picture from one of those "things" on 137.620MHz showing a lot of cloud.

Re-reading RadCom I saw an advert for a group called RIG who specialise in remote imaging. Could this be what I was doing? Let's find out. "Hello, Ray Godden, what's it all about? please." The info-pack was back to me in a flash with the name of a local RIG contact. Tom Saunders wondered who this madman was who called him that evening. Tom (G8AEE) kindly invited me to his home and demonstrated his PROscan receiver and other radio gear. Tom's knowledge and enthusiasm for weather and satellites in general held me spellbound. I left his home absolutely converted and staggering under the weight of literature that he so kindly lent me. RIG had a new member and I had a new friend.

The months passed quickly and my interest grew. I upgraded to the PROscan receiver and PROsat hardware/software. I had built my own crossed dipole antenna but decided to invest in a RIG turnstile and a pre-amp. I was up and running a weather satellite receiving station. Well, I was running a station in it's broadest terms. The polar-orbiters were giving me problems with interference. Weeks of antenna experimentation took place and I soon found that orienting the crossed dipole in a north east to south west direction improved things. I still had problems with interference when the satellite was over the north of Scotland. This really did puzzle me until one night in a howling gale with gusts up to 70 mph I had to call my son to help me lower the crossed dipole. Next day, with the antenna only 15 feet above ground, I got a full 15 minute pass with no interference. I had found the problem - reflections.

A niggling problem had arisen. My computer, a 386DX, was throwing out horrendous RFI. The images received on VHF in particular were badly affected. What to do about it? The RFI was getting back into the 240V ac house wiring

and a trip to a local electronic store saw the purchase of three clip-on ferrite cores for the mains leads. One on the computer's lead, one on the monitor's lead and one on the power supply's lead. Problem solved so back to work.

One problem though was that I knew very little about interpreting what I saw. The RIG magazine kept appearing every quarter and Peter Wakelin's articles were avidly read, photocopied and carefully filed away. I had, via RIG, made another friend. I still have far to go in interpreting weather patterns. I now have a small library of books and find something new each day that stretches my mind and makes me ask that simple question Why?

With the station settling down, my wife, Maureen, came up with another of her brilliant ideas. "Why don't you become a Radio Amateur?" she asked one evening, "I'm sure you would enjoy it and you could talk satellites with Tom; it would be cheaper than the phone". I explained that I really had no interest in Amateur Radio and that the computer/programming/satellites/electronics were quite enough to keep my mind active. I began to wonder if I really was the "master of the house" when I sat the RAE last May! Women's logic knows no bounds and now after three months as a licensed Radio Amateur, both on phone and packet, I have realised that I now have a limitless source of information regarding weather satellites, amateur satellites, SAREX missions and the Russian MIR space station. The latest addition to my gear being a Yaesu FT-726R transceiver with the amateur satellite module fitted.

Now all of the above you may think of as an indoor pursuit. This is far from the case. I havn't got a farm like Henry's where I grow and harvest; I simply have an antenna farm. As people walk past they gape in awe at the dishes, Yagis, verticals and crossed dipoles. It's not long before their curiosity gets the better of them. The opening gambit is usually "Are you getting that Red Hot Dutch satellite TV on that big dish?" "No I receive the weather satellites" I reply. This is followed by a long silence. "Do you mean like what we see on TV?" they say. "The very same except I'm six hours ahead of what you see on TV." I retort.

On their "next pass" they usually hover to see if I'm around and ask me what the weather is going to be like. I then get asked "What kind of pictures do you receive?" That is when I know I've got a bite. I usually invite the person in and demonstrate the gear. I now have a number of new friends some of whom have joined RIG and are contemplating setting up their own stations.

Really, you would think that's the end of the story but it isn't. I have been contacted by local school teachers and college lecturers for advice and help. This particularly interests me as I really do believe that this is a subject that should be shared with our children and young people. The area is now widening as I have been contacted by a college in Greater Manchester. Finally, I will be giving a talk

on the technical aspects of weather satellites to our local Probus Club, of which I am a member.

It's now five years since life as I knew it ceased. I was a Communications Engineer but now I'm a RIGlet and have never been so busy or enjoyed life as much as I do now. I used to manage with a 24 hour day but now I really wish I had 48 hour days because there's so much to do and so much to learn.

Well, I'd better put away my trumpet - I've blown it for long enough. ●

SUBMISSION OF ITEMS FOR PUBLICATION AND COPY DEADLINES

Please send contributions to the Editor. Although typed and hand-written items will be considered we would prefer longer pieces to be on a PC disk in one of the popular word-processing formats, ideally in WordPerfect. Drawings and diagrams may be submitted on disk, preferably in a Windows Meta File compatible format, but please send hard copy also. To reproduce well, satellite images must have a good range of tones. Contact the Editor for further information.

COPY DEADLINE FOR THE SEPTEMBER ISSUE: 25 JULY 1994

Advertisers' copy is required by 18 JULY 1994 and should be sent direct to Michael Gill (address on page 2). ●

PROGRAMMING AMIGASAT'S OPERATION WITH AREXX

Geoff Hatto

If I said that you really did have the ability to write your very own Amiga programs, would you believe me? What if I said that there is a programming language so powerful that you can perform very useful functions with just a handful of program lines? And what If I told you that this wonderful programming language was free? Would you still believe me?

Well it's true. The programming language in question is called ARexx and it's built in to all Amiga computers supplied with V2.04 (or better) of the operating system. What's the catch? Commodore don't provide any documentation for ARexx when you buy the machine (unless you buy a 'big box' Amiga such as the A4000).

This short article will briefly describe what ARexx is, how it benefits Amiga applications such as Amigasat and even includes example scripts for you to try!

Most people cringe when the words 'writing your own programs' are used so what makes ARexx different? Well, for a start, ARexx scripts are simply created with any text editor and run straight away (no compiler required) and the language has been designed to be very easy to learn.

So how does this marvellous language benefit programs like Amigasat? Well, ARexx has one trick up its sleeve that most languages have never heard of; direct control over other applications. ARexx is able to talk directly to programs and execute operations within them. ARexx can do this because of the Amiga's pre-emptive multitasking and message passing system.

This means that programs like Amigasat suddenly have access to data and functions from other programs with almost unlimited control. Since version 3.0, Amigasat has over 60 ARexx functions built in, which cover every operation the user can perform manually plus many that can only be operated from ARexx.

ARexx is not limited to talking to one application per script. You can address any ARexx compatible application you like at any time in your ARexx script. That means you could easily command Amigasat to decode images and automatically log them into your database. Or how about automatically decoding a selection of images, using Amigasat, and passing them to your word processor where you automatically format them into a weather report and have it printed out! How about total hands-free operation of the Amiga in an Exhibition centre? All of these things are possible with ARexx.

So, how do you get started with your first ARexx script? There is one 'high tech'

operation to perform before you can do anything. There is a program called RexxMast (ARexx master program) with an icon that looks like a king's crown in the 'System' directory. This icon should be double clicked to start the ARexx system. Since you don't want to do this each time you reset your machine, simply drag the icon into the WBSTARTUP drawer (V2.04 Amigas and above) where it will be started automatically each time you restart your machine.

Now for your first ARexx script. All ARexx scripts MUST start with a comment. A comment is any text that appears between /* and */. The program script itself is simply a list of instructions describing the operations an application or ARexx itself will perform. To make sure the ARexx system is working, use the example below which simply prints "HELLO" on the Shell screen using the built-in ARexx 'say' command.

```
/* Your first ARexx script */
say 'HELLO'
```

Enter it into a text file called ram:test.rexx using a text editor of your choice. Now open a shell, if you haven't already done so, by double clicking on the SHELL icon in the 'System' directory of workbench. Type the following at the shell prompt to check that the script works:

```
rx  ram:test.rexx
```

If all goes well, "HELLO" should appear in the shell window. Now for a more adventurous example. Let's get Amigasat to zoom in to a weather image in memory in stages, saving the screen image at each step to build an animation, then play the animation backwards and forwards (PingPong) for one hundred frames before stopping. Type the following into another file using a text editor, this time call it ram:rigzoom.amsrx (Please note, Amigasat owners who do not have version 3.1 must change AMIGASAT.1 to AMIGASAT_1 in the second line of this example)

```
/* RIGZOOM.AMSRX Ensure image is loaded before execution! */
address 'AMIGASAT.1'    /* Talk to Amigasat               */
'Anim_Erase_All' /* Erase existing animations from memory */
'Screen_To_Front'     /* Let's see what we are doing      */
leftedge = 0          /* First zoom setting               */
topedge  = 0
width    = 570
height   = 500
do 10    /* repeat ten times between here and 'end'       */
'Zoom_Xn' leftedge topedge width height /* Zoom in!       */
```

```
'Append_Anim_Frame'          /* Add to animation            */
leftedge = leftedge + 10     /* Make zoom size smaller      */
topedge  = topedge  + 10
width    = width    - 20
height   = height   - 20
end

/* Play backward and forward for 100 frames     */
'Anim_Play_PingPong' 100
```

To test the script, run Amigasat and load an image into the first display. Select the Amigasat menu item 'Screen To Back' in the 'Display' menu to get back to the Workbench screen. At any shell prompt, type:-

```
rx ram:rigzoom.amsrx
```

Watch to see what happens. If the Amigasat screen is displayed and you want to run or edit the script again, select the Amigasat menu item 'Screen To Back' to get back to the workbench screen.

You will find that ARexx is not only a relatively painless language to learn but is fun too. In only a few lines of code you can do quite spectacular things by calling up the power of other applications.

The Amigasat 'Extensions' that are provided with Amigasat V3 are simply ARexx scripts whose file names end with '.amsrx'. You can run the example above directly from the 'Extensions' item in the 'Project' menu instead of from a Workbench Shell. In this way, the Arexx script appears to the user as though it were part of the Amigasat package. You can create any number of these scripts and have them available in Amigasat at any time.

Well that's enough for now but for more information on ARexx and Amigasat, consult the Amigasat User's guide. There are several books available on ARexx programming, such as the Abacus book 'Using ARexx on the Amiga' by Zamara and Sullivan ISBN 1-55755-114-6. ●

RUGBY 60 KHz TIME-SIGNALS (MSF)

Members who use this service to correct their computer clocks may be interested to know that during the annual antenna maintenance period the transmitter will be off daily between 0800 and 1600UT. Maintenance is due to begin at 1200UT on 4 July and end at 1200 on 18 July. Transmitter maintenance continues to take place on the first Tuesday in every month. ●

THE APT "STEALTH" ANTENNA

John L DuBois, W1HDX
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Background

The patch, or microstrip, antenna has become a common workhorse for the microwave spectrum from about 1 GHz to tens of GHz. This type of antenna consists of two conducting layers separated by a dielectric to form an extended capacitor. Often the the structure is planar, the sides about 1/2 wavelength long and the separation a few percent of the wavelength. It performs as a resonant cavity which radiates from the electromagnetic fields at the edges. The great utility of this form comes from the possibility of conforming its shape to just about any application: missiles, airplanes, hand-held GPS, etc. and from the ease of fabrication which makes arrays of patch elements both accurate and low in cost. At microwave wavelengths, patch elements are usually made by "printed circuit" or photolithographic techniques. The radiation pattern of patches depends on the final shape of of their radiating edges but in the planar form is a smooth, hemispherical pattern without nulls. In effect, gain is traded for uniform coverage over half a sphere. The radiation can easily be made to have linear or circular polarization. Finally, an identifying property of patch antennas is narrow bandwidth, up to only a few percent of the design center frequency.

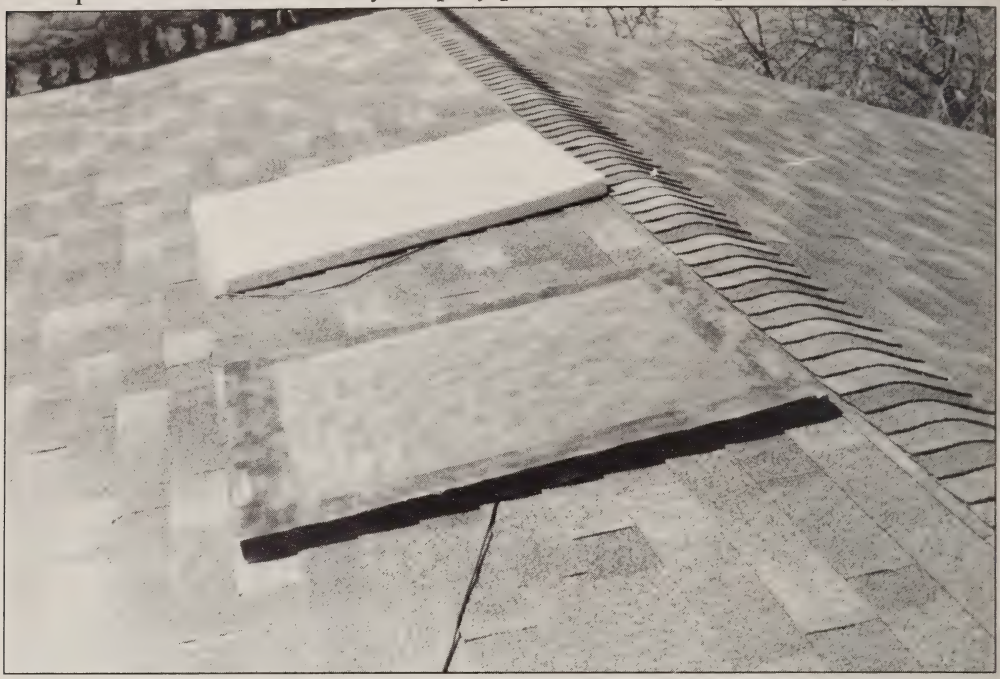
The properties described are not ideal for every application. They do, however, seem to answer the problems unique to reception of polar-orbiting APT weather satellites. Here, we want a hemispherical shape to the pattern particularly without an overhead null which is characteristic of dipole or monopole elements. We also want circular polarization and narrow bandwidth to reject nearby (in frequency) sources of VHF interference. Existing APT antennas which answer these desires are available in the quadrifilar helix and Lindenblad designs. These are mechanically intricate, however, and it seems worthwhile to investigate weather the patch design could offer a third alternative.

Design

A quick calculation shows that a 1/2 wavelength patch for 137.5 MHz would be about 43 inches on each side assuming free space wavelength. Since the thickness will be only a few inches this may not be too large. How will we build it? Printed circuit board material this large is heavy, not easy to obtain and, even at 1/8 inch thickness, would yield a very narrow bandwidth in the finished antenna. Happily, there is an ideal material available from the home construction industry. Foam insulating board is available with aluminum foil facing pre-applied to both sides. It comes in 4 ft. by 8 ft. sizes, is 2 inches thick and, at first glance, seems like it was made for building patch antennas at VHF

wavelengths! The only minor unknown is the dielectic constant of the foam.

View of finished antennas on rooftop. The antenna closer to the camera has been painted with brown acrylic spray paint in a "rooftop camoflage" pattern.



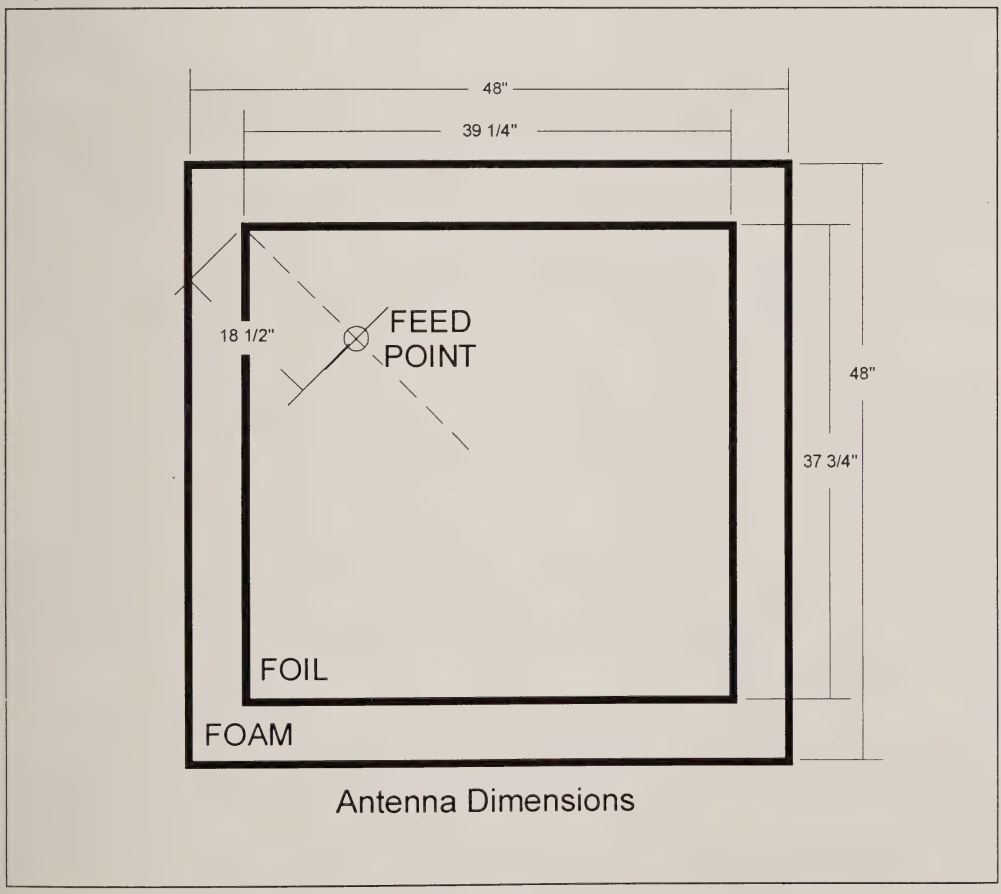
The double foil faced foam board material is available from larger building supply stores and from insulation specialty supply stores. The foam material is polyisocyanurate and there are at least two manufacturers: Celotex and Owens Corning. The Celotex brand name is "Tuff-R" and the Owens Corning brand name is "Energy Shield". In the Boston area in early 1994 the price was about $23.00 per sheet.

A test patch was made from scrap material with active patch dimensions of 21 x 14 inches to determine the the foam dielectric constant. For an assumed value between 1.0 and 1.20, the calculated resonant frequency of this patch would range from 256.7 MHz to 235.9 MHz. The measured figure was 246.4 MHz, indicating a constant of just under 1.1.

A simple linear polarized patch design proceeds by using the radiation from only one pair of sides. (A general design reference is: "Microstrip Antenna Design", K.C. Gupta A. Benalla, Artech House, Norwood, MA, 1988, ISBN 0-89006-331-1.) Resonant frequency is determined by the entire area between faces but the principal radiation mode is determined by the longest side.

Circular polarization, on the other hand, is achieved by making the patch almost square so that there are two resonant modes from adjacent sides, separated in frequency by approximately the bandwidth desired. Both modes are excited by feeding the antenna along a diagonal. Radiation from the two modes has a relative phase shift because of the difference in resonant frequencies and by careful calculation this phase shift can be made 90 degrees, producing an "automatic" circular polarization. (There are other feed methods to obtain circular polarization but this one is simple and produces an acceptable bandwidth.) A calculation fo 137.5MHz center frequency produces patch dimensions of 37.75 x 39.25 inches for the 2 inch thick foam board. The feed point for right hand circular polarization and approximately 50Ω impedance lies 18.5 inches from the outside corner along a diagonal running according to Figure 1. It is important to get this right as using the diagonal displaced by 90 degrees will produce left hand circular polarization.

Figure 1



Antenna Dimensions

A patch is usually assumed, for calculation, to lie above an infinite ground plane. However, experience shows thad a ground plane about 10% larger than the patch on all sides is adequate for most applications. Here, for simplicity, we will cut the 4 ft by 8 ft raw sheet in half and use the resulting 48 inch square as the basic ground plane and cut the foil on the other side to be the patch. Feeding the patch is also simple. Since the feed point impedance has been designed for 50 ohms, a coaxial cable shield can be attached to the ground plane side and the center conductor run straight through the foam and attached to the patch on top. Since it is almost impossible to solder to aluminum film, we use small pieces of copper foil with conductive adhesive to form solderable regions around the locations for attaching coax. Such foil with conductive adhesive is not common but one source is: McMaster Carr, PO Box 440, New Brunswick, NJ, 08903-0440, (908) 329-3200, catalog #76555A644 for a 36 yard roll of 1" tape. Since this is a lot of tape to buy for one antenna, the author will be happy to supply two 1" squares for a self addressed and stamped envelope (USA only).

Construction

To make the antenna: Cut the 4 ft x 8 ft foam board in half to get a 4 ft x 4 ft piece. Then, on one side, mark out a rectangle on the foil 39-1/4 inches by 37-3/4 inches centered on the board. Using an Exacto knife or scalpel, cut thru the foil along the lines you have laid out. It's OK to cut a little ways into the foam when you do this as the foam is pretty strong stuff. Now peel off the outer strips of foil to leave the 39-1/4 by 37-3/4 inch rectangle of foil in the center of the board. This peeling may be a little tedious in places where the foil-paper stuff wants to stick but be patient and tease it up. Don't worry about chipping away some of the foam in the process as it won't have any affect on the antenna.

Now orient the board with the 39-1/4 inch dimension along the top in front of you and the 37-3/4 inch dimension toward you. Mark a diagonal from the top left corner to the lower right corner. Then mark a point 18-1/2 inches along and on this diagonal from the upper left corner. This is where the feed point will be. Punch a 1/8 inch hole all the way thru the board at this point with an awl or drill bit and trim the foil edges of this hole clean. Take two pieces of copper foil about 1 inch x 1 inch with conductive adhesive. Cut a 1/16 inch hole in the center of one and a 1/8 inch hole in the center of the other one. Stick the one with the 1/8 inch hole over the punched hole in the foam board on the side which does NOT have the cut rectangle.

Take a convenient length of RG58 and separate the shield and center conductor for a distance of 2-1/4 inches. Strip off the center insulation for 1/4 inch and tin the center conductor. Cut the shield to a length of about 3/8 inch and mash out flat at a right angle to the cable. Push the center conductor thru the copper foil you have stuck to the foam board so that the shield fits up flat against the copper

foil. The tinned center conductor should be sticking out the other side of the board. Solder the shield to the copper foil using a minimum of heat. Now fit the copper foil piece with the 1/16 inch hole over the tinned RG58 center conductor on the other side of the board and stick it to the foil on the board. Make sure you have trimmed the center insulation back far enough for the foil to fit flat against the board. Bend the center conductor over and solder it to the copper foil using a minimum of heat. Note that you will have to remove the blue protective film from the sticky side of the adhesive copper foil before using it.

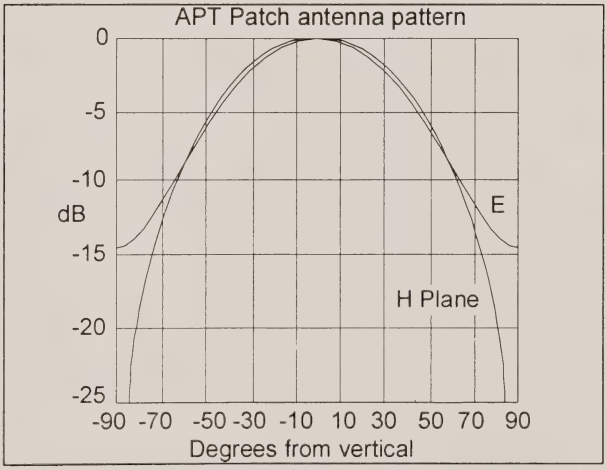
The front of the antenna is the side with the cut foil square. It can be mounted by nailing, clamping or screwing down through the exposed foam sides around the cut pattern but keep the fasteners at least an inch away from the front foil pattern. The final result will weigh about 3 pounds. As with any APT antenna, a good, low noise preamp should be located close to the antenna itself.

The weather resistance of this antenna has yet to be seriously tested. The polyisocyanurate foam's cell size is very small and we would not expect it to absorb much moisture. However, a light spray of clear or colored acrylic has very little effect on the resonant frequency and will effectively seal any exposed foam. The foil surfaces can be likewise coated with no effect. It is probable that extended exposure to the ultraviolet components of sunlight will weaken the exposed foam but there should be little practical problem from this effect.

Results

Figure 2.

The calculated pattern of this patch is shown in Figure 2. The E and H plane patterns are almost identical above 20 degrees elevation. Under 20 degrees, there is a null in the H plane but the E plane pattern goes "below the horizon". We would expect from this to see reduced or poor performance below about 10 degrees for the circular polarized configuration used.



The swept return loss (in a 50Ω system) measured on the prototype to evaluate impedance matching is shown in Figure 3. The maximum value of -18 dB at 136.6MHz corresponds to a VSWR of 1.3:1 which is entirely acceptable. This curve also shows the bandwidth of the antenna to be about 8 MHz which is also

acceptable.

Live reception was tested using the Quorum Communications "Explorer" PC board and "QFAX" software. Signals and image were clear and strong over satellite elevation angles between 10 and 170 degrees. Under about 10 degrees, as predicted, reception fell off and picture noise observed. The pattern of noise bands suggested that the antenna had several minor maxima and nulls in this region.

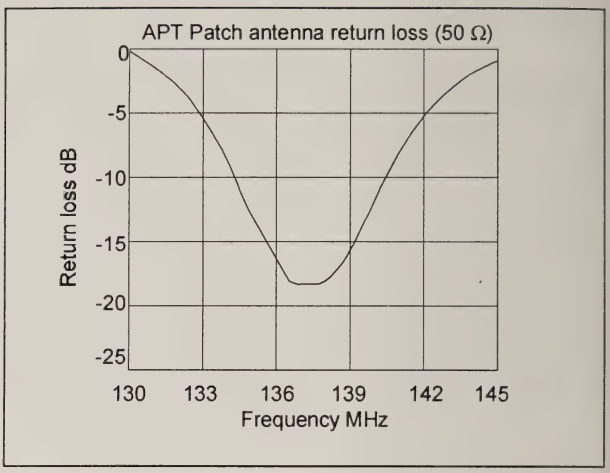


Figure 3.

Since this patch has only a 2 inch profile on a roof and can be painted in a variety of colors, it will be very hard to detect from a distance. For situations where zoning, neighbors or spouses present objections to "unsightly" antennas, this construction may well solve the problem and still permit APT reception. As a result, it seems appropriate to call it a Stealth Antenna.

[**Editor's note:** The foam board is available in the UK from insulation specialists and some builder's merchants in similar sheet sizes; 1200 x 2400 x 50mm. Warren Insulation on the Poyle Industrial Estate near Heathrow quote a price of £21 + VAT. Copper tape with a conductive adhesive is available from RS. As the minimum quantity costs £22 + VAT and is sufficient for about 300 antennas, I will supply a quantity sufficient for one antenna upon receipt of a small self-addressed envelope.

Metric conversions: 1 inch = 25.4mm. 1 foot = 12 inches = 304.8mm] ●

TH2 IMAGING

A change has taken place within the partnership of TH2 Imaging. Whilst TH2 Imaging will continue to market the TH2SAT version 2.2 Weather Satellite hardware/software package for the PC, the Meteosat Loop Yagi antennas will noe be constructed and marketed by Hibbert Electronics. This antenna will be known as the YCV Loop Yagi. ●

INTERPRETING WEATHER SATELLITE IMAGERY - PART 8

Peter Wakelin

I have just received an image from NOAA 9 as it passed over the central Mediterranean Sea. Malta and Gozo are clearly visible in a cloudless sky and the sea temperature is 18 degrees. Can I be certain that the above statement is true? There's no doubt about the first few words as I can see Malta and Gozo on the image. Is the sky really cloudless though? Could there be a cloud, perhaps 100m across, in the area? Could there be thousands of similar clouds each 1km from its neighbour? The pixel on the IR image I measured certainly indicated a temperature of 18 but if there were some "invisible" clouds in the area would I be getting a true measurement of the sea temperature?

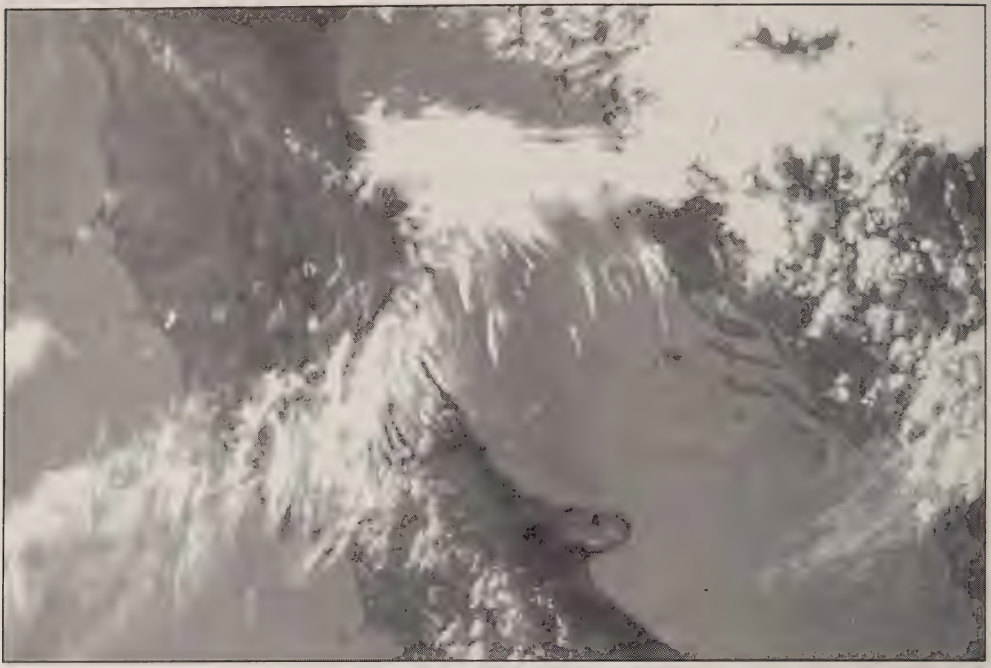
It is all a question of the resolution of the sensors, or how far apart two objects must be for the sensor to recognise them as two and not a single object. The resolution of the image display, whether it be on a monitor or printed output, is also an important factor and it should be at least as good as the sensor's to get the most from a system. The resolutions of the geostationary weather satellites are around 4km at best which are similar to those of the APT systems on the polar-orbiters. HRPT from the NOAA satellites is about 1100m and the imagers on Landsat and Spot manage about 30 and 10m respectively. The Russians are selling images with 5m resolution and the ones they are not selling are probably much better than that.

Don't get alarmed and turn the page for I am not going deeply into the mathematics of resolution or into the theory of black-body emmissivity. With the help of a few images I just want to point out that what you see on your monitors can so easily be misinterpreted.

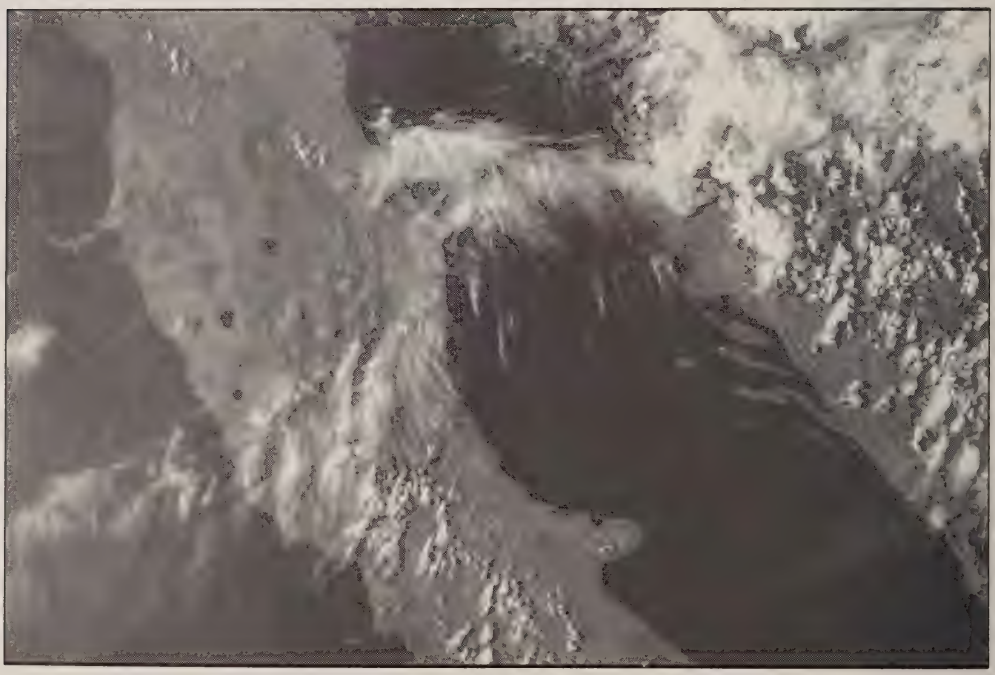
Now back to the questions I posed at the beginning. A few small clouds 100m across would not be noticeable on the visible image. A larger number of such clouds over the sea, which normally appears almost black would have the effect of turning the pixels grey but individual clouds of this size would not be visible even on an HRPT image. Likewise, in the IR image, the effect of small clouds in the pixel area, assuming them to be at a different temperature to the underlying surface, would be to change the grey level of that pixel. So the sea temperature may not be 18 degrees after all.

In the above example the clouds I had in mind were the little fluffy ones that float around on fine days (fair weather cumulus or cumulus humilis to be correct), but what about those thin, tenuous, very high, cold, cirrus clouds that sometimes cover a large part of the sky? How do they appear on the images? The NOAA 11 images of Italy show a band of cloud extending across the Rome area, northeastwards into the Adriatic Sea and on into Bosnia. In the top one,

NOAA 11 HRPT ch 4 IR. 1 May 1994 1505UT Central Italy



NOAA 11 HRPT ch 2 vis. 1 May 1994 1505UT Central Italy

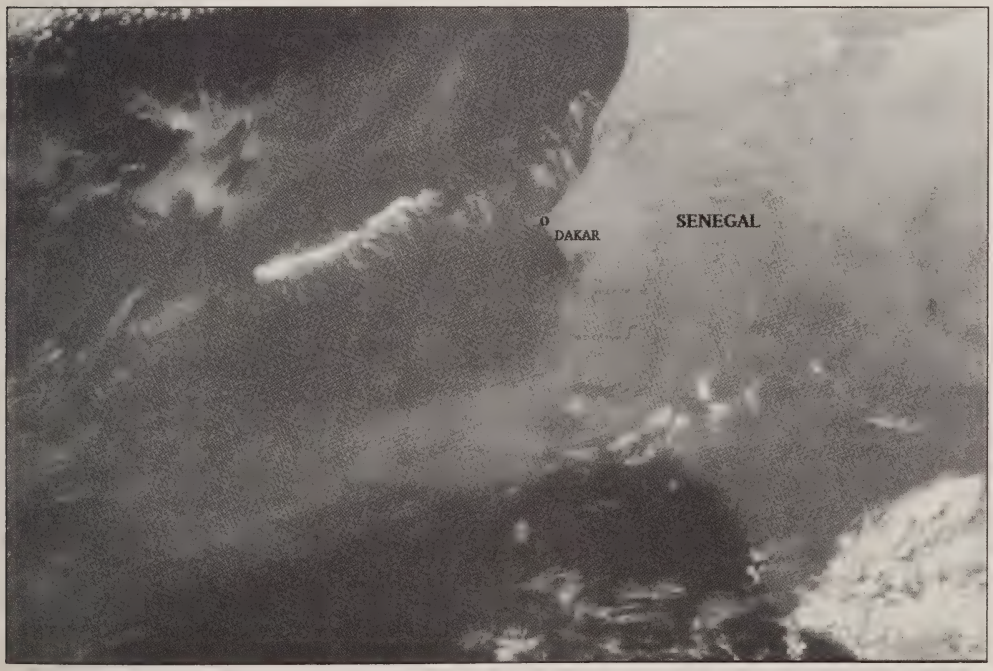


which is the channel 4 IR, this cloud band looks quite thick and could be interpreted as an active frontal zone, perhaps with rain reaching the surface. Yet, looking at the visible image from channel 2, it is clearly just cirrus cloud, thin enough in places over Italy to see through and detect convective cumulus clouds over the Appenines below. As a general rule, cirrus cloud usually looks much more "threatening" on an IR image than it is in reality. Next time you see cirrus cloud ahead of a depression spreading across your area on the D2 images at night have a look up at the sky when you kick the cat out. You may well see stars (and the cat will too, if you kick too hard!).

In RIG 36 there was a good image of a major sand-storm in the Sahara Desert (page 47). The sand particles, which have been carried to great heights, can remain in suspension for a very long time before falling back to Earth. However, even when widely dispersed the sand can sometimes have a pronounced effect on the IR images although it may be barely discernible on the visible frames.

The raw, visible image of western Africa showed nothing more than a slight "fuzziness" over the coastal part of southern Senegal and The Gambia, yet contrast-stretching revealed a vast area of dust in suspension in the atmosphere over the Atlantic Ocean. On the other hand, the IR image showed quite a significant difference in grey level in the area affected by the sand indicating a temperature of 27 in southern Senegal where the dust is thickest, yet 49 in the

METEOSAT 5 PDUS vis 26 April 1994 1130UT Western Africa



METEOSAT 5 PDUS IR 26 April 1994 1300UT Western Africa

relatively dust-free zone to the east of Dakar. Although the absolute values of temperature may be in error by several degrees, the difference of 22 is probably about right. Now there is absolutely no possibility of the surface temperature being as low as 27 degrees inland in southern Senegal at local noon at the end of April with a cloudless sky and the sun within a degree or two of the zenith! Even the swampy rice-growing areas would have a higher surface temperature than that. The ground temperature was probably near to 50 but the satellite's sensor was being influenced by the dust in suspension. [Measurements two days later at the same spots after the dust had cleared gave readings of 49 to the east of Dakar and 47 in southern Senegal.] In the example in RIG 36 the sand in the active storm was sufficiently dense for no radiation from the ground to penetrate it and reach the satellite. The sensor therefore indicated the top of the dust as being very cold, as expected at a great height. In this case, however, the dust is so tenuous that it is barely visible yet thick enough for the IR sensor to record a value somewhere between the temperature of the ground and the temperature of the top of the dust layer. Cameras may never lie but it is often very difficult to extract the true meaning of an infrared sensor's reading.

Earlier, I stated that clouds 100m across and 1km apart would not be visible on an HRPT image. If, in the space of 100 minutes before the satellite came around again, all these clouds drifted to form a line 100m wide and many kilometres long would they then be visible? Probably yes. It was certainly known during

World War II that pipe-lines and even overhead power transmission lines could be seen in aerial photographs even when the thickness of the object was well below the theoretical resolution of the camera.

Aircraft condensation trails, or contrails for short, fall into the category of long and thin objects and readers of RIG 35 will know that they can be seen on HRPT infrared images. Aviation fuel consists almost entirely of carbon and hydrogen atoms which when burned in air in the aircraft's engines produce carbon dioxide and water-vapour. The low ambient temperature at aircraft height and rapid expansion on leaving the jet means the water-vapour turns into water or ice very rapidly. If the water-vapour in the air is already close to saturation, as it is in gently ascending air ahead of a warm front, for example, the contrail may well persist for a considerable time rather than revert to water-vapour and become invisible. The width of a contrail starts off as the separation of the aircraft's engines, perhaps 20m and soon increases to a few hundred metres but as they only persist in stable air the thickness remains at a few tens of metres.

As contrails are high, cold and thin it will come as no surprise to learn that on satellite images they have similar properties to the thin, cold cirrus clouds mentioned earlier. In that case, like cirrus, they will be less prominent on visible images than on infrared ones. My final image is of northwest France at HRPT 1.1km resolution in channel 2. I have not reproduced the IR image because it

NOAA 10 HRPT ch 2 vis 29 April 1994 0725UT Contrails over NW France

showed little else other than contrails! However, many are visible on this channel 2 image as straight lines. Some have expanded to a few kilometres in width and are dispering but several are very narrow and have obviously only just been formed. If the printer's reproduction is good you may see some dark lines as well. As coal-burning aircraft went out of service quite some time ago they cannot be black contrails! These dark lines are shadows of contrails on the ground. Near St Brieuc there are two parallel lines oriented in a NW to SE direction. The light one nearest to the Channel Islands is the contrail and its shadow lies almost over St Brieuc. Another contrail passes over Angers but it is not visible, yet its shadow on the ground is just discernible, about 1/3 of the way towards Nantes.

I will leave you with a little puzzle. When this image was received from NOAA 10 at 0725UT on 29 April 1994 the satellite was on a heading of 193 degrees. At St Brieuc at that time the sun was in azimuth 095 and at an elevation of 23 degrees. The shadow over St Brieuc and the contrail are separated by 24km so how high was the aircraft? ●

QUESTIONS AND ANSWERS

Q. What is a 'phasing harness'?

A. In order to increase directivity and gain, or to provide polarisation other than linear, antennas may have multiple elements to be connected to the feed system An example is the crossed-dipole array often used for reception of polar-orbiting satellites. It is not generally possible to simply connect elements in parallel; the signals have to be combined with appropriate phases and impedance has also to be considered. One convenient and low-loss method is to use lengths of coaxial cable to provide time delays which equate to phase changes. For complex antennas the appearance of the cable system can be reminiscent of a horse's harness, hence the name. In the crossed-dipole case the 'harness' is very simple; a length of coax delays the signal from one element by 90 degrees of phase (a quarter wavelength) so that the antenna has circularly polarised characteristics. This is so that reception is independent of the attitude of the satellite relative to the receiving antenna.

Q. I use Timestep's software and dump images to a printer but am infuriated by their cheap and childish advertisement printed under every image. How can I eliminate it?

A. Timestep's answer is "Use a guillotine or Snopake". If anyone has found an alternative permanent solution please let the Editor know of it. Printing via another software package such as Windows Paintbrush is one method and it also

permits prints of different sizes.

Q. What causes the bands of interference on my images across north Africa and the Mediterranean and sometimes across the English Channel?

A. This phenomenon is probably caused not by interference but by nulls in the received signal level. These are often periodic as the satellite appears over the horizon, probably due to multi-path propagation and/or diffraction effects. If it occurs when the satellite is in full radio view, as it is when over the Channel, the cause is likely to be signal cancellation at the receiving antenna possibly due to some metal object(s) in the vicinity. However, it could be that a nearby pager transmitter is causing interference, especially if not all satellite frequencies are affected.

Q. Why was NOAA 9 off for so long recently?

A. Don't complain, they may switch it off permanently! NOAAs 9 and 11 both transmit on 137.62MHz and NOAAs 10 and 12 are both on 137.50MHz. If two satellites transmitting on the same frequency are above the horizon at the same time then mutual interference will occur at a receiving station unless highly directional antennas are employed. The older satellite in each pair is slightly lower than its partner so goes a little faster. Consequently, it catches it up and overtakes it occasionally. As they take about 15 minutes to cross from horizon to horizon, one of the pair (usually, but not always, the older one) is switched off when they get to within 15 minutes of each other and remains off until after passing and getting 15 minutes ahead.

The length of time one is off is dependent on the difference in the orbital period of the pair. NOAA 9 and NOAA 11's period differ by less than 3 seconds so in a day NOAA 9 gains only 40 seconds on NOAA 11 so to get from 15 minutes behind to 15 minutes ahead takes about 45 days. NOAA 10 gains about 151 seconds a day on NOAA 12 so is off for just 12 days. If withdrawal symptoms are very severe and you really can't last for 45 days without your favourite satellite then upgrade to HRPT. That requires a directional antenna so the HRPT transmitter can remain on for most of the APT silent period.

You may think that as the orbital planes of NOAAs 9 and 11 have now drifted so far apart they could not clash anyway. That may be the case at low and temperate latitudes but in polar regions they get quite close at times. There may not be any RIG members near the poles but I believe a few other people use these satellites as well.

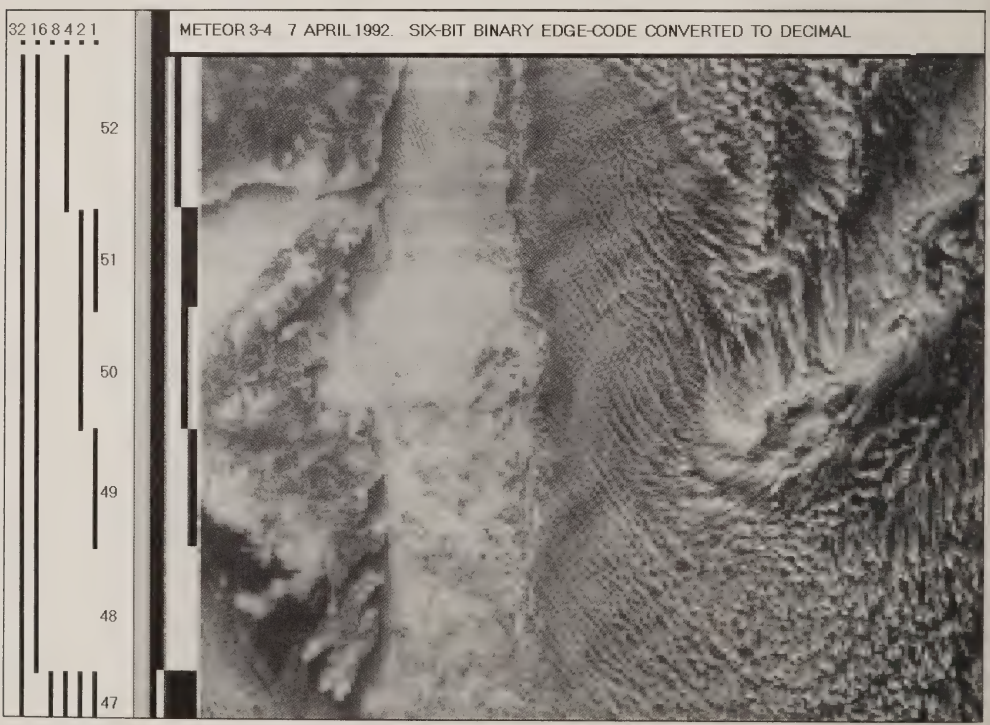
Q. I have tried to detect signs of geothermal activity in Iceland on APT infrared images but without success. Can HRPT images detect this or volcanic activity?

A. Locally in Iceland the temperatures are sufficently high compared with adjacent areas but the sizes of the hot-spots are probably too small to be seen on HRPT imagery. Volcanos are a different matter. Smoke from Mt Etna can sometimes be seen in APT images. HRPT infrared imagery can readily record one or two hot pixels when Etna's peak is cloud-free.

Q. Peter Wakelin mentioned recently that the edge-codes on the Meteor images vary between 10 and 63. Where are these numbers?

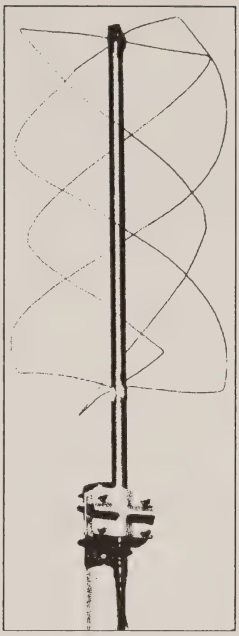
A. The varying black bars down one side of the image comprise a six-bit binary code. There are 6 bars in close proximity which can be switched to black or white. Outwards from the picture they represent, in order, values of 2 raised to the power of 0, 1, 2, 3, 4 and 5 or, in our familiar decimal notation, 1, 2, 4, 8, 16 and 32. Just add the values of the black bars together to get the decimal value. On the accompanying image, which shows part of Newfoundland, the edge-code has been re-drawn with spacing between the bars for clarity.

If the values are increasing when an image is being received, the intensity of sunlight on the surface below is decreasing and the imager's aperture is being increased to compensate. When the value reaches 63 (1+2+4+8+16+32) all the bars are black, sunlight is very weak below and the imager will switch off.



A COMPACT, CHEAP, VOLUTE ANTENNA FOR POLAR-ORBITERS

Mark Pepper



There are many different types of antenna suitable for use with polar orbiting satellites. The helix, Lindenblad, quadrifilar helix and the crossed dipole just to name a few. Their only common design criterion is that they should detect circularly polarised radio waves in the 137MHz to 138MHz range. It is also desirable that they be omnidirectional and they should be sufficiently robust for outdoor use.

Of those mentioned above the crossed dipole is undoubtedly the most popular, mainly due to its simple construction. However, it is by no means the most efficient one for the job. Along with its close cousin, the "egg-beater", they are suitable for outside mounting but are large. The helix and Lindenblad are both over a metre in diameter and require to be supported on non-conducting frameworks. Although suitable for loft mounting they would certainly present a challenge to fit onto a standard TV antenna pole.

The volute is related, certainly in looks, to the quadrifilar helix. However, it is more compact, it out-performs the crossed dipole and construction is straightforward. Although at first glance the volute looks fragile, experience in recent extreme wind conditions has shown this not to be the case. Its low-profile construction makes for an almost invisible, sturdy antenna with good performance and it costs only a few pounds.

The volute described here has only 8 components; two lengths of copper tubing, a copper end-cap, a PL259 and 4 lengths of 2mm copper wire. Construction does not appear to be too critical and the dimensions I used were from a design by Michael Gill.

The volute consists of a vertical, slotted, 22mm, copper tube surrounded by four 3/4 turn helixes. The slotted tube contains a smaller 15mm diameter copper tube fitted with an end-cap. The central tube connects directly to the centre pin of the PL259 and the outer tube connects to the outer screen of the PL259.

Construction starts with the cutting of two 500mm long slots into the larger diameter copper tube. This is possibly the most difficult part of the construction. I borrowed a nibbling tool that conveniently cut a 3mm wide slot but a saw could be used as the width is not critical. One tip is to use a piece of dowel or

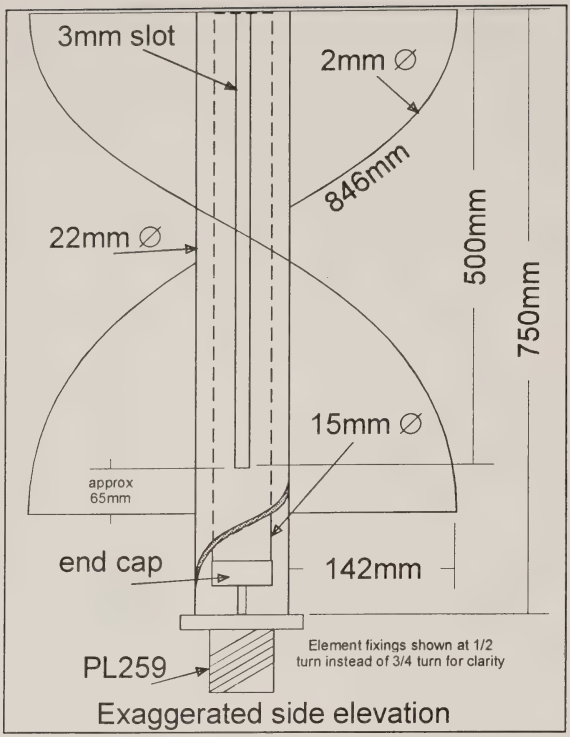


Figure 1

something similar to support the open end of the partially slotted tube while cutting the remainder of the slot. I used a wooden file handle and clamped the lot in my work bench. Another tip is to cut the slots before cropping the tube to its correct length (750mm). This way if you make a mistake you can just make the slot longer and crop the tube at the top end too. When the slots have been successfully cut, crop the slotted tube to 750mm long.

Next, drill a hole in the centre of the 15mm tube cap. The hole should have the same diameter as the centre pin of the PL259 which is then soldered into it. The tube is then soldered into the cap. Usually, these caps contain a solder ring within a raised ridge and to reduce the risk of its touching the outer tube, this ridge may be filed off after soldering. A large iron is required here, and also later in construction, as copper conducts heat very well. I used a small pen type blow-torch which worked admirably. At this stage the 15mm copper tube should not be cut to its correct length; leave it about 800mm long.

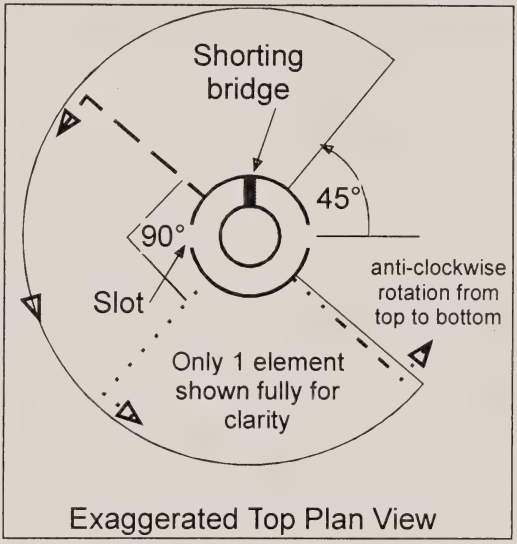
Now slide the 22mm tube over the PL259/tube construction and check that it sits squarely on the square mounting face of the PL259. The end of the tube and mounting face of the PL259 will be soldered together shortly. Mark the inner tube so that its length matches the end of the outer tube. The inner tube can now be cut to length but ensure that you do not snap off the PL259 from the other end in the process.

Before soldering the outer tube to the PL259, tape should be wrapped around the centre and 20mm or so from the top of the inner tube. This should be thick enough to keep the inner tube away from the outer and to stop the sides of the outer tube's slots touching. Once this has been done the outer tube is soldered to the mounting face of the PL259. Filing the face and tube end first may help the solder flow more easily. Try to solder this joint quickly as prolonged heating melts the plastic dielectric in the PL259. Test that the two tubes are not shorting

by using a ohmmeter between the inner and outer connections on the PL259. If there is a short it is most likely to be at the PL259 end. Check and re-solder if neccessary.

When you are happy with the join to the PL259, a small shorting bridge is fitted to the top of the tubes to connect the inner tube to the outer one. File a corresponding slot in the top of each tube and solder a short piece of 2mm copper wire across them. You should now have a solid construction that does not rattle and provides a DC short between the inner and outer cores of the PL259. If not, re-examine your construction so far and correct before continuing.

Figure 2



To construct the helical elements first cut 4 lengths of wire to 1130mm length. Next, put a 90 degree bend 142mm from both ends of each element. The ends of the wire elements should be filed to fit into shallow indentations drilled in the outer tube with a 2mm bit. These indentations are drilled 90 degrees apart starting at 45 degrees from the centre of one of the slots (see figure 2). The top four should be as close to the end of the tube as possible and the lower four 65mm below the bottom of the slots. Ensure that the polarity is correct; the helix should wind anti-clockwise for 3/4 turn from top to bottom when viewed from above. The helix will not be precisely cylindrical but the elements will be drawn in slightly towards the centre tube. Apparently, this improves performance. Soldering is facilitated if the tubes are clamped in a vertical position and it should be done carefully, using ample solder, as the strength of these joints determines the overall robustness of the antenna. A piece of surplus copper placed in contact with one joint will act as a heat-sink and prevent re-melting when the adjacent one is made. Alternative methods of fastening the helix to the tube could be considered. Soldering brass bushes to the tube and clamping the helix with grub-screws is a possibility or an additional 10mm on the ends of the helix elements could be bent over and soldered to the tube.

To weather-proof the antenna the slots are covered with water-proof tape and the top bound with strips of self-amalgamating tape and then covered with water-proof tape. No water should be allowed to get into the PL259 as it will

inevitably get from there into the coax and, as I have experienced, down into the pre-amp or receiver.

Acquiring the parts for the volute should not prove difficult. The copper tube used is standard 22mm and 15mm plumbing stock as is the 15mm end-cap. I found that all DIY stores stocked the tube but only a few stocked it in short 1m lengths. The 2mm copper wire was stripped from 20A, solid-cored, mains cable. The PL259 can be found in most electronic parts catalogues and in radio shops and at rallies around the country. The total cost should be no more than £5.

Acknowledgement:

Full credit for the design of this particular volute is due to Michael Gill, G6HOM, who kindly provided a sketch of his antenna with dimensions.

Further Reading:

The Satellite Experimenter's Handbook. Chapters 7 & 8.
Martin Davidoff. American Radio Relay League 1990. ISBN 0-87259-004-6

Weather Satellite Handbook 4th Edn. Chapter 2.
Dr Ralph E Taggart. American Radio Relay League 1990. ISBN 0-87259-319-3

VHF UHF Manual 4th Edn. P8.43 - 8.47.
G R Jessop. Radio Society of Great Britain 1992. ISBN 0-900612-92-4

Resonant Quadrifilar Helix Design.
C C Kilgus. Microwave Journal Dec 1970.

FOR SALE LOGITECH Scanman 32 grey-scale hand-held scanner complete with interface card, DOS and Windows software and manuals. As new. £40 including postage.

COLORIX VGA paint package as new. £25 including postage. Mike Preece. 0282 455433 (evenings)

FOR SALE SKYVIEW fax interface unit for serial port. Suitable for HF Fax reception. With software and manual. Boxed. £15. Paul Adamson, 0243 376594.

CONTROL OF TWIN ANTENNAS FOR POLAR-ORBITERS

Paul Adamson

Articles have appeared in previous RIG journals showing how twin crossed dipoles can give increased range and reduced noise at the beginning and end of pictures. The system that I use consists of two RIG antennas mounted at about 100 degrees to each other on a single pole. There is no apparent interference between the antennas and, with the system described, the point where the antennas are switched over is invisible on the image. An automatic system will be needed if full passes are to be captured whilst the system is unattended.

The heart of a switching system is a good, well screened relay. The Omron type G4Y-152P was obtained from J.A.Crew & Co., Watery Gate Farm, Dovers Hill, Chipping Campden, GL55 6QU but, at the time of writing, I understand that they have very few left. It was described by them as "good to 900 MHz" and performs very well. However, any good co-axial relay would be suitable.

A Manual System

For those using a receiver which feeds DC power to the co-ax for a down-converter or preamp, no additional wiring is needed. The only parts required are the relay, a small radio frequency choke, a piece of Veroboard and a metal box to act as a screen. This box will need connectors for the down-lead, and for each antenna. Solder the relay to the Veroboard and then connect the strip, to which the down-lead core is attached, to one end of the relay coil via the choke. This will allow the D.C. from the receiver to pass whilst preventing any of the signal getting "lost" in the relay coil. Figure 2 shows the layout. It's a good idea to solder all unused Veroboard strips together and earth them to provide a good earth plane.

The antennas can now be switched, about half way through the pass, by applying power up the co-ax. The 'S' meter gives an indication of when to switch, but there is considerable latitude as to when this is done - about a couple of minutes, in fact. The switching point is invisible on the picture and I've been unable to detect any loss of signal. The box can be mounted anywhere, but close to the twin aerials would be best (mine is just inside the loft, to avoid waterproofing). Another advantage is that I do know that the wives of some RIG members suffer from the "not another wire" syndrome, and we haven't run a single extra wire up to the loft!

Now, this scheme has some drawbacks. Many RIG members, I've heard, like to sit back lazily with their feet up and watch their pictures come in. The trouble with twin antennas is that, at some stage, you have got to put down either your

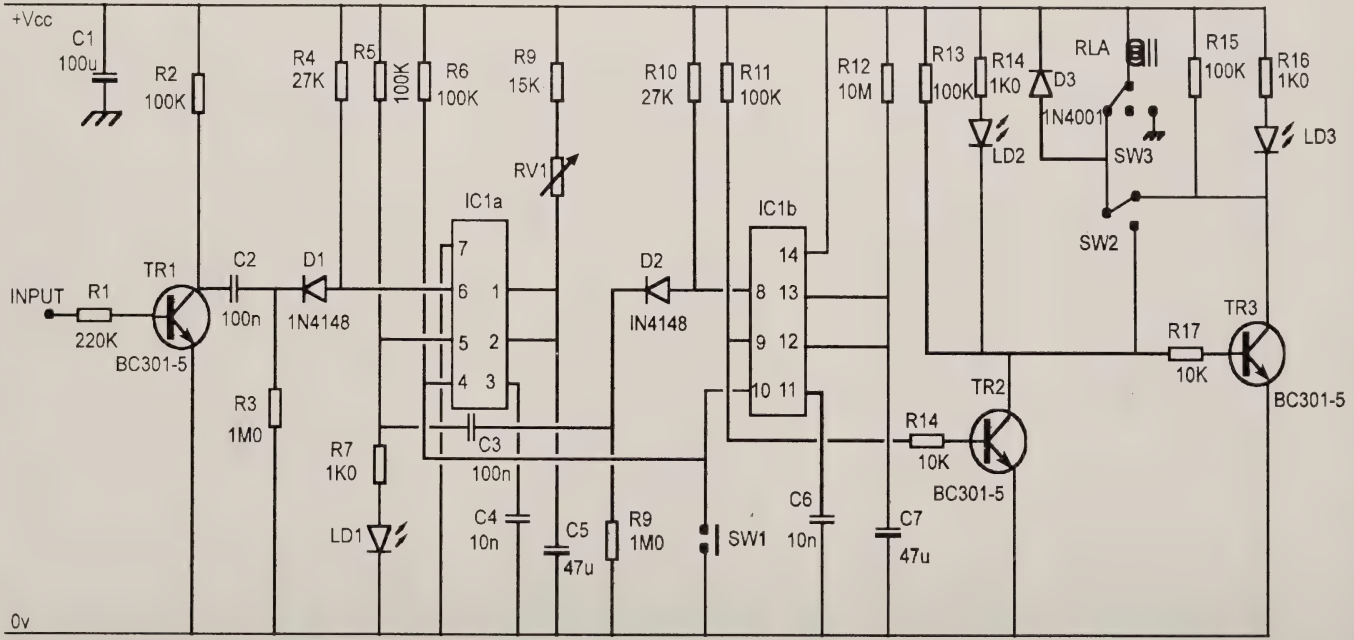

+Vcc
C1
100u
R2
100K
R4
27K
R5
100K
R6
100K
R9
15K
RV1
R10
27K
R11
100K
R12
10M
R13
100K
R14
1K0
D3
1N4001
RLA
R15
100K
R16
1K0
LD2
LD3
SW3
SW2
IC1a
IC1b
INPUT
R1
220K
TR1
BC301-5
C2
100n
D1
1N4148
D2
IN4148
R3
1M0
R7
1K0
LD1
C3
100n
C4
10n
C5
47u
R9
1M0
SW1
C6
10n
C7
47u
R14
10K
TR2
BC301-5
R17
10K
TR3
BC301-5
0v

Figure 1.

pipe or your pint and flick a switch. If this is too much to ask, then I suggest the next stage.

A Fully Automatic System

Before embarking on this project, I strongly recommend that you get out your back-issues of the RIG Journal and build Richard Gedge's excellent "intelligent squelch" described in Issue 25, if your receiver hasn't already got one. Before I added this, my timer would sit patiently, waiting for the satellite to arrive and, just before AOS time, the Lady of the house would start making pastry with an electric mixer. Click went the squelch, and away went the timer. Result - only half an image, or none at all! The intelligent squelch has entirely cured this problem.

The circuit is based on the NE556 dual timer, which is cheap. Not many of the components are critical, and most were dictated by what I had available. There are doubtless better ways of achieving the same end, but the circuit does work satisfactorily.

The input comes from the receiver squelch via the on-board relay. Only one wire is needed providing the receiver and the timer have a common ground. The timers in this chip are triggered by a negative pulse, so TR1 inverts the receiver output and triggers IC1(a). Note that nothing happens to the relay at this stage; it remains in the state you set it to initially. RV1 sets this first timed period, which should be approximately one half of the satellite AOS to LOS time. The output from IC1(a) then returns to the low state and triggers IC1(b). At this point the relay switches over, and remains in its new position for a period determined by R12. At the end of the second timed period, which should be longer than the second half of the satellite pass, the output of IC1(b) goes low, the relay returns to its former state, and the circuit resets itself ready for another pass. Switch SW2 enables the output to the relay to be taken from the collector of either TR2 or TR3, so that the relay can be "waiting" with either the north or south facing aerial active, depending on the pass direction. LD1 monitors the state of the first timer; LD2 and LD3 monitor the state of TR2 and TR3. D3 is included "just in case" any spikes from the relay coil should damage the transistors. SW3 is to enable the timer to be over-ridden and controlled manually when required.

A suggested Veroboard layout is shown, though there are doubtless better ones. R8 and RV1 consist of a rotary switch with resistors soldered across the contacts. The first resistor is R8, after which I suggest 4M7 then steps of 1M. This will give times of about 1 second (useful for testing), 5 minutes and thereafter about 1 minute per megohm, depending on component tolerances. If you're using this for Meteor passes, you could need up to 10 minutes as the first timed period.

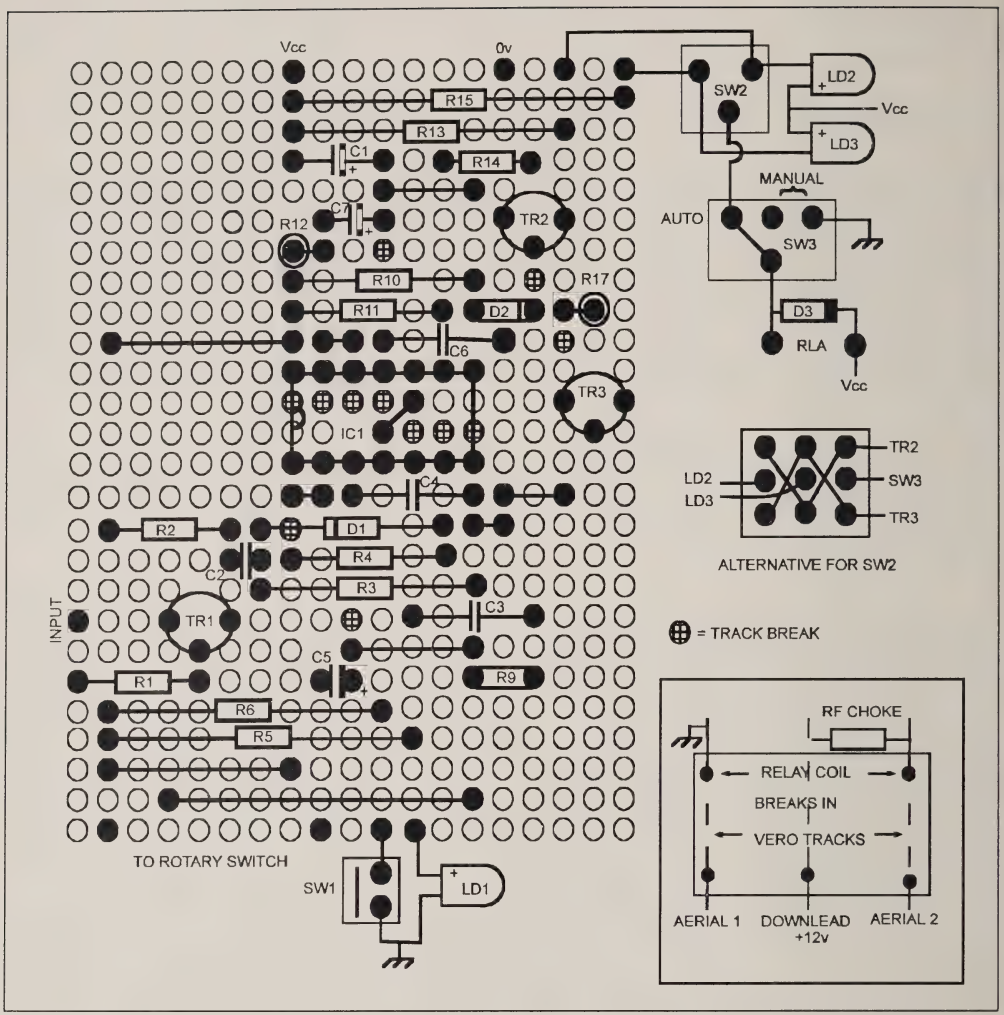


Figure 2.

The second timed period could be set in the same way with a rotary switch, but usually any period longer than half a pass will do; so R12 is a fixed resistor and 10M will give about 10 minutes before the circuit resets itself. The reset button is included as either of the timers may trigger when the unit is first switched on. The link joining the two reset pins of the IC can be soldered underneath the board if the IC socket doesn't allow enough room. D3 can conveniently be soldered across the relay contacts.

Note that LEDs 2 and 3 monitor the states of TR2 and TR3. When SW2 is used to reverse the state of the relay and antennas, the LED which indicated the south

NOAA 9 PERIOD 101.92 MINS FREQUENCY 137.62MHz

TIME OF ACQUISITION OF SIGNAL - 52.5 DEG NORTH 0 DEG EAST

11/06	09.18	19.08	14/07	08.54	20.26	16/08	10.11	20.02
12/06	09.05	20.37	15/07	08.41	20.13	17/08	09.58	19.49
13/06	08.52	20.24	16/07	10.09	20.00	18/08	09.45	19.36
14/06	08.38	20.11	17/07	09.56	19.47	19/08	09.32	19.23
15/06	10.07	19.58	18/07	09.43	19.34	20/08	09.19	19.10
16/06	09.54	19.45	19/07	09.30	19.21	21/08	09.06	20.38
17/06	09.41	19.32	20/07	09.17	19.08	22/08	08.53	20.25
18/06	09.28	19.19	21/07	09.04	20.37	23/08	10.22	20.12
19/06	09.15	19.06	22/07	08.51	20.23	24/08	10.08	19.59
20/06	09.02	20.35	23/07	08.38	20.10	25/08	09.55	19.46
21/06	08.49	20.21	24/07	10.07	19.57	26/08	09.42	19.33
22/06	08.36	20.08	25/07	09.53	19.44	27/08	09.29	19.20
23/06	10.05	19.55	26/07	09.40	19.31	28/08	09.16	20.49
24/06	09.51	19.42	27/07	09.27	19.18	29/08	09.03	20.36
25/06	09.38	19.29	28/07	09.14	19.05	30/08	08.50	20.23
26/06	09.25	19.16	29/07	09.01	20.34	31/08	10.19	20.09
27/06	09.12	19.03	30/07	08.48	20.21	01/09	10.06	19.56
28/06	08.59	20.32	31/07	10.17	20.08	02/09	09.52	19.43
29/06	08.46	20.19	01/08	10.04	19.55	03/09	09.39	19.30
30/06	10.15	20.06	02/08	09.51	19.41	04/09	09.26	19.17
01/07	10.02	19.53	03/08	09.38	19.28	05/09	09.13	20.46
02/07	09.49	19.39	04/08	09.24	19.15	06/09	09.00	20.33
03/07	09.36	19.26	05/08	09.11	20.44	07/09	08.47	20.20
04/07	09.23	19.13	06/08	08.58	20.31	08/09	10.16	20.07
05/07	09.09	20.42	07/08	08.45	20.18	09/09	10.03	19.53
06/07	08.56	20.29	08/08	10.14	20.05	10/09	09.50	19.40
07/07	08.43	20.16	09/08	10.01	19.52	11/09	09.37	19.27
08/07	10.12	20.03	10/08	09.48	19.39	12/09	09.23	19.14
09/07	09.59	19.50	11/08	09.35	19.26	13/09	09.10	20.43
10/07	09.46	19.37	12/08	09.22	19.12	14/09	08.57	20.30
11/07	09.33	19.24	13/08	09.09	20.41	15/09	08.44	20.17
12/07	09.20	19.11	14/08	08.55	20.28	16/09	10.13	20.04
13/07	09.07	20.39	15/08	08.42	20.15	17/09	10.00	19.51

MORNING PASSES ARE SOUTHBOUND EVENING PASSES ARE NORTHBOUND

TIME OF ACQUISITION OF SIGNAL - 52.5 DEG NORTH 0 DEG EAST

11/06	06.41	16.27	14/07	06.47	16.33	16/08	06.52	16.38
12/06	06.17	17.44	15/07	06.22	17.50	17/08	06.28	17.55
13/06	05.52	17.20	16/07	05.58	17.25	18/08	06.04	17.31
14/06	07.09	16.55	17/07	07.15	17.01	19/08	07.20	17.07
15/06	06.45	16.31	18/07	06.50	16.37	20/08	06.56	16.42
16/06	06.20	17.48	19/07	06.26	17.53	21/08	06.32	16.18
17/06	05.56	17.23	20/07	06.02	17.29	22/08	06.07	17.35
18/06	07.13	16.59	21/07	07.19	17.05	23/08	05.43	17.10
19/06	06.49	16.35	22/07	06.54	16.40	24/08	07.00	16.46
20/06	06.24	17.51	23/07	06.30	16.16	25/08	06.35	16.22
21/06	06.00	17.27	24/07	06.06	17.33	26/08	06.11	17.38
22/06	07.17	17.03	25/07	07.22	17.08	27/08	05.47	17.14
23/06	06.52	16.38	26/07	06.58	16.44	28/08	07.04	16.50
24/06	06.28	17.55	27/07	06.34	16.20	29/08	06.39	16.25
25/06	06.04	17.31	28/07	06.09	17.36	30/08	06.15	17.42
26/06	07.20	17.06	29/07	05.45	17.12	31/08	05.51	17.18
27/06	06.56	16.42	30/07	07.02	16.48	01/09	07.07	16.53
28/06	06.32	16.18	31/07	06.37	16.23	02/09	06.43	16.29
29/06	06.07	17.35	01/08	06.13	17.40	03/09	06.19	17.46
30/06	07.24	17.10	02/08	05.49	17.16	04/09	05.54	17.21
01/07	07.00	16.46	03/08	07.05	16.52	05/09	07.11	16.57
02/07	06.35	16.22	04/08	06.41	16.27	06/09	06.47	16.33
03/07	06.11	17.38	05/08	06.17	17.44	07/09	06.22	17.50
04/07	05.47	17.14	06/08	05.52	17.20	08/09	05.58	17.25
05/07	07.04	16.50	07/08	07.09	16.55	09/09	07.15	17.01
06/07	06.39	16.25	08/08	06.45	16.31	10/09	06.50	16.37
07/07	06.15	17.42	09/08	06.21	17.48	11/09	06.26	17.53
08/07	05.51	17.18	10/08	05.56	17.23	12/09	06.02	17.29
09/07	07.07	16.53	11/08	07.13	16.59	13/09	07.19	17.05
10/07	06.43	16.29	12/08	06.49	16.35	14/09	06.54	16.40
11/07	06.19	17.46	13/08	06.24	17.51	15/09	06.30	16.16
12/07	05.54	17.21	14/08	06.00	17.27	16/09	06.06	17.33
13/07	07.11	16.57	15/08	07.17	17.03	17/09	05.41	17.08

MORNING PASSES ARE SOUTHBOUND EVENING PASSES ARE NORTHBOUND

TIME OF ACQUISITION OF SIGNAL - 52.5 DEG NORTH 0 DEG EAST

11/06	05.07	14.58	14/07	05.04	16.37	16/08	05.01	16.34
12/06	04.55	16.28	15/07	04.52	16.25	17/08	04.49	16.21
13/06	04.42	16.15	16/07	04.39	16.12	18/08	06.18	16.09
14/06	04.30	16.03	17/07	06.09	16.00	19/08	06.06	15.57
15/06	05.59	15.50	18/07	05.56	15.47	20/08	05.53	15.44
16/06	05.47	15.38	19/07	05.44	15.35	21/08	05.41	15.32
17/06	05.34	15.25	20/07	05.31	15.22	22/08	05.28	15.19
18/06	05.22	15.13	21/07	05.19	15.10	23/08	05.16	15.07
19/06	05.10	15.01	22/07	05.07	16.39	24/08	05.03	16.36
20/06	04.57	16.30	23/07	04.54	16.27	25/08	04.51	16.24
21/06	04.45	16.18	24/07	04.42	16.15	26/08	06.20	16.11
22/06	04.32	16.05	25/07	06.11	16.02	27/08	06.08	15.59
23/06	06.02	15.53	26/07	05.59	15.50	28/08	05.55	15.46
24/06	05.49	15.40	27/07	05.46	15.37	29/08	05.43	15.34
25/06	05.37	15.28	28/07	05.34	15.25	30/08	05.30	15.21
26/06	05.24	15.15	29/07	05.21	15.12	31/08	05.18	15.09
27/06	05.12	15.03	30/07	05.09	16.42	01/09	05.06	16.39
28/06	05.00	16.32	31/07	04.56	16.29	02/09	04.53	16.26
29/06	04.47	16.20	01/08	04.44	16.17	03/09	04.41	16.14
30/06	04.35	16.08	02/08	06.13	16.04	04/09	06.10	16.01
01/07	06.04	15.55	03/08	06.01	15.52	05/09	05.58	15.49
02/07	05.52	15.43	04/08	05.49	15.40	06/09	05.45	15.36
03/07	05.39	15.30	05/08	05.36	15.27	07/09	05.33	15.24
04/07	05.27	15.18	06/08	05.24	15.15	08/09	05.20	15.11
05/07	05.14	15.05	07/08	05.11	15.02	09/09	05.08	16.41
06/07	05.02	16.35	08/08	04.59	16.32	10/09	04.55	16.28
07/07	04.49	16.22	09/08	04.46	16.19	11/09	04.43	16.16
08/07	04.37	16.10	10/08	06.16	16.07	12/09	06.12	16.03
09/07	06.06	15.57	11/08	06.03	15.54	13/09	06.00	15.51
10/07	05.54	15.45	12/08	05.51	15.42	14/09	05.47	15.38
11/07	05.42	15.33	13/08	05.38	15.29	15/09	05.35	15.26
12/07	05.29	15.20	14/08	05.26	15.17	16/09	05.23	15.14
13/07	05.17	15.08	15/08	05.13	15.04	17/09	05.10	16.43

MORNING PASSES ARE SOUTHBOUND EVENING PASSES ARE NORTHBOUND

TIME OF ACQUISITION OF SIGNAL - 52.5 DEG NORTH 0 DEG EAST

11/06	07.19	18.47	14/07	07.06	18.34	16/08	08.33	18.20
12/06	08.38	18.26	15/07	08.25	18.12	17/08	08.11	17.58
13/06	08.17	18.04	16/07	08.03	17.50	18/08	07.49	17.37
14/06	07.55	17.42	17/07	07.41	19.10	19/08	07.28	18.56
15/06	07.33	19.01	18/07	07.19	18.48	20/08	07.06	18.34
16/06	07.11	18.39	19/07	08.39	18.26	21/08	08.25	18.12
17/06	08.30	18.17	20/07	08.17	18.04	22/08	08.03	17.50
18/06	08.08	17.55	21/07	07.55	17.42	23/08	07.41	19.10
19/06	07.46	17.34	22/07	07.33	19.01	24/08	07.19	18.48
20/06	07.25	18.53	23/07	07.11	18.40	25/08	08.39	18.26
21/06	07.03	18.31	24/07	08.31	18.18	26/08	08.17	18.04
22/06	08.22	18.09	25/07	08.09	17.56	27/08	07.55	17.42
23/06	08.00	17.47	26/07	07.47	17.34	28/08	07.33	19.01
24/06	07.38	19.07	27/07	07.25	18.53	29/08	07.11	18.39
25/06	07.16	18.45	28/07	07.03	18.31	30/08	08.30	18.17
26/06	08.36	18.23	29/07	08.22	18.09	31/08	08.08	17.56
27/06	08.14	18.01	30/07	08.00	17.48	01/09	07.47	17.34
28/06	07.52	17.39	31/07	07.39	19.07	02/09	07.25	18.53
29/06	07.30	18.59	01/08	07.17	18.45	03/09	07.03	18.31
30/06	07.08	18.37	02/08	08.36	18.23	04/09	08.22	18.09
01/07	08.28	18.15	03/08	08.14	18.01	05/09	08.00	17.47
02/07	08.06	17.53	04/08	07.52	17.39	06/09	07.38	19.07
03/07	07.44	19.12	05/08	07.30	18.59	07/09	07.16	18.45
04/07	07.22	18.50	06/08	07.08	18.37	08/09	08.36	18.23
05/07	07.00	18.29	07/08	08.28	18.15	09/09	08.14	18.01
06/07	08.20	18.07	08/08	08.06	17.53	10/09	07.52	17.39
07/07	07.58	17.45	09/08	07.44	19.12	11/09	07.30	18.58
08/07	07.36	19.04	10/08	07.22	18.50	12/09	07.08	18.36
09/07	07.14	18.42	11/08	07.00	18.29	13/09	08.27	18.15
10/07	08.33	18.20	12/08	08.20	18.07	14/09	08.06	17.53
11/07	08.11	17.58	13/08	07.58	17.45	15/09	07.44	17.31
12/07	07.49	17.37	14/08	07.36	19.04	16/09	07.22	18.50
13/07	07.28	18.56	15/08	07.14	18.42	17/09	07.00	18.28

MORNING PASSES ARE SOUTHBOUND EVENING PASSES ARE NORTHBOUND

facing antenna will now indicate the north facing one! This problem can be overcome by replacing SW2 with a 2-pole 3-way switch. The assignment of each LED can then be changed at the same time as the unit is switched over, so that the same LED always indicates the same antenna which is much less confusing. R7, R14 and R16 are not on the board, and are not shown on the Vero diagram, but can be soldered to the LEDs. Alternatively, use LEDs with built-in resistors.

The same switching unit in the loft can still be used, fed by two wires, one to each end of the relay coil. The choke is not now required, as the signal is now kept away from the coil. One pole of the relay coil is connected to the positive supply.

Well, I hope the above proves useful to someone. I suppose that the next step would be to run an automatic tracking program so that the more distant passes can be received noise-free. John Tellick and Mike Goodall referred to this in recent articles but, to run both systems at once, automatically, would require two computers or, I suspect, OS2 or Windows NT. Can anyone enlighten me? ●

Components List

R1	220K
R2,5,6,11,13	100K
R3,9	1M0
R4,10	27K
R7,14,16	1K0 (see text)
R12	10M
R15,17	10K
RV1	1-pole 12-way rotary switch + R8(15K) + 4M7 + approx 5 1M0 (see text)
C1	100u electrolytic
C2,3	100n ceramic
C4,6	10n ceramic
C5,7	47u 16V tantalum
IC1	NE556 dual timer
TR1,2,3	BC301-5
LD 1,2,3	any LEDs
D1,2	1N4148
D3	1N4001
SW1	Push to make
SW2	2-pole 1-way or 2-pole 3-way (see text)
SW3	2-pole 1-way centre off

Veroboard, connecting pins, connectors for power, input, output, etc.

NOISE, ANTENNAS AND TEMPERATURE

Ray Godden

This article is intended to look at some of the noise aspects of geostationary satellite reception. In particular to explain the relationship between Noise Figure and signal/noise ratio in a typical system. The cost of LNAs (Low Noise Amplifiers) seems to head for infinity as their Noise Figure in dBs approaches zero and it is not very obvious why such small changes in Noise Figure have such a dramatic effect on performance. I have attempted to explain some of the background physics with a little (simple) mathematics.

Back to Basics

In 1828 it was noticed that microscopic pollen grains suspended in water were in constant motion ("Brownian" motion). At first this was thought to be because they were alive but it was eventually realised that they were being buffeted by the random motion of the molecules of the water and that the amplitude of the motion was proportional to absolute temperature. Absolute temperature is expressed in degrees Kelvin (K) above absolute zero (-273°C), the temperature at which everything becomes quiescent.

In the case of electrical systems conduction depends on the movement of particles carrying electronic charge and these, like the water molecules, are in a state of agitation with an amplitude proportional to absolute temperature. This random variation of velocity generates an electrical signal, known as thermal noise, or Johnson noise after the physicist who confirmed the relationship. All communication systems are limited in performance by this effect which is unavoidable except by cooling all parts of the system to 0K, which does not help as everything will stop working!

Thermal noise originates only in the dissipative, or resistive (associated with attenuation, or loss), term of an electrical impedance. Pure reactance, capacitive or inductive, generates no noise. What is of interest in a communication system is the amount of noise power - power is a more fundamental quantity than voltage or current - which is added as an unwanted signal to the signal we want to receive. The amount of noise power delivered to a conjugate (matched) load per unit bandwidth (Hz) can be calculated by a very simple formula:-

P = kT where P = power in watts. k = Boltzmann's constant in joules/°C.
T = Absolute temperature

Note that the noise power does not depend on the actual impedance, or on physical size - a pin generates as much noise as a battleship at the same temperature! At very high frequencies and very low temperatures quantum

effects become significant but for our purposes the formula holds very closely. Boltzmann's constant, k, is 1.38 X 10-23 which, luckily for us, is a very small number. It was first determined, not as one might expect by some sensitive electrical measurement, but by observing the random motion of a tiny mirror suspended in air.

Noise Figure

With modern semiconductor devices it is relatively easy to design and manufacture radio receiving systems with as much amplification (gain) as desired. For reception of geostationary weather satellites, such as Meteosat, sensitivity will be limited by the noise performance of the early stages of the receiver, including the LNA (Low Noise Amplifier) if one is used. The purpose of the LNA is not to increase gain but to reduce the noise level at the point where the signal arrives; the gain should be sufficient to compensate for any cable loss before the receiver and to make the noise contribution of later stages insignificant. Performance is usually characterised by a number, in dB, known as the Noise Figure.

Noise Figure is defined by the IEEE as:-
"The ratio, at a specified input frequency, of the noise power at the output when the noise temperature of the input termination is standard (290K or 17°C) to that portion engendered at the input frequency by the input termination at the standard noise temperature."

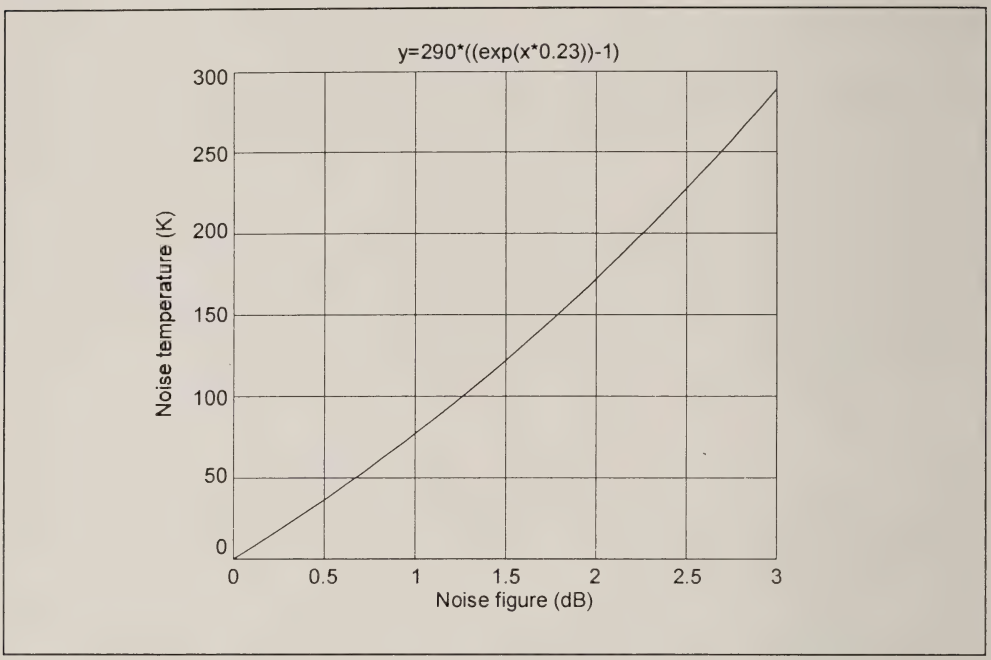
This definition does not perhaps provide an immediate understanding of the meaning of the term. It can be thought of as a measure of the amount of noise generated by the system or device being specified compared to the noise generated at room temperature by its appropriate input resistive termination, typically 50Ω. However, when receiving signals from space the "input termination" is the antenna system and this is "seeing" a much lower temperature, hence the dramatic effect of small changes in Noise Figure.

Specifying performance in terms of Noise Figure in dB is not particularly convenient because contributions from different parts of the system cannot be simply added up. To make things easier and more understandable Noise Figure can be converted to equivalent noise temperature, which, since it represents uncorrelated noise power, can be added to other noise contributions. The relationship between the two can best be illustrated by a graph (Figure 1).

Because a decibel (dB) scale represents ratios as logarithms there is not a straight-line relationship between Noise Figure and noise temperature. As you can see for a noise temperature of 290K the Noise Figure is 3dB (ratio = 2): i.e. the system noise power is equal to the termination noise power resulting in

double the noise power. Noise temperature does not represent an actual physical temperature, it is a measure of noise power generated expressed in degrees K.

Figure 1.



The Antenna

An antenna for reception of a geostationary satellite is pointing into space. The temperature of deep space, the "cold sky" is not zero but a few degrees K which is thought to be due to residual energy from the "Big Bang" when the Universe was created. Various effects however mean that the temperature "seen" by an antenna on earth is somewhat higher than the cold sky temperature.

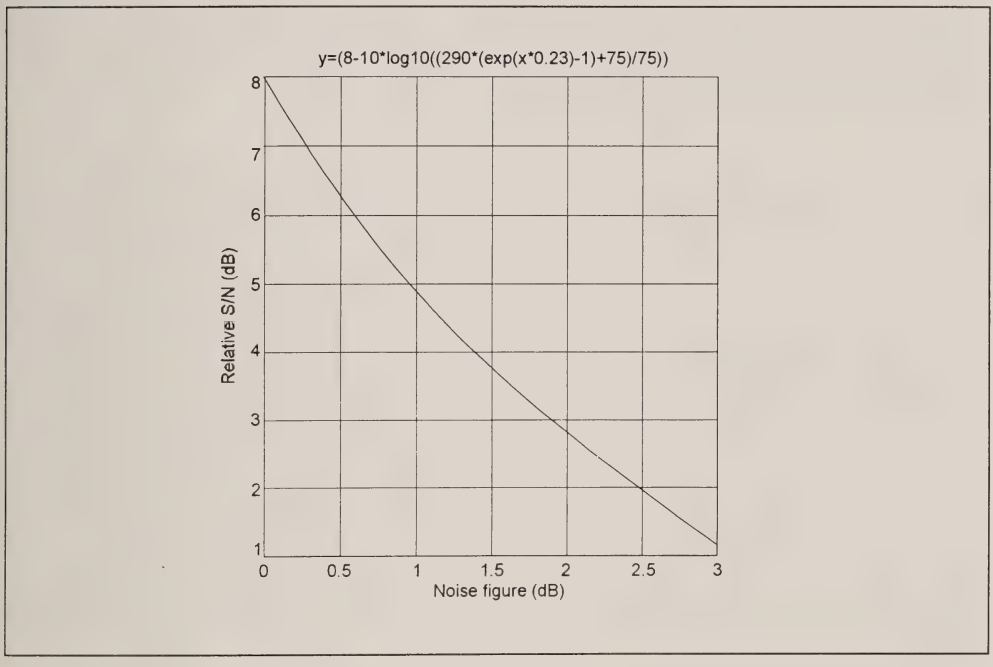
There is dissipative attenuation due to the Earth's atmosphere and, since the atmosphere has a temperature above absolute zero, some noise results. The antenna, due to spill effects and the side-lobes of its polar diagram, receives some noise energy from the ground. There may be stellar radio sources in the beamwidth - an extreme example is the Sun, as reported by Peter Wakelin in RIG 35. Losses in the antenna will add noise.

Adding together all these contributions, a typical noise temperature for an antenna used for Meteosat reception is about 75K.

Relationship between Noise Figure & Signal-to-noise Ratio (S/N)

Taking the above situation with an antenna noise temperature of 75K the effect of receiver Noise Figure on the received carrier signal-to-noise ratio can be calculated (Figure 2). The vertical axis is relative S/N to an arbitrary reference - the graph shows the degradation in S/N as Noise Figure changes from zero to 3. For example, an improvement in Noise Figure from 2.5dB to 1.0dB improves S/N by 3dB, equivalent to doubling the area of a dish antenna. Near the threshold of an FM receiver small changes in carrier S/N can have a disproportionate effect on the S/N of the demodulated signal - even more so in the case of the error rate of a digital signal.

Figure 2.



Conclusions

In the practical case the performance increase to be gained by LNAs having very low Noise Figures is significant but limited. Any dissipative loss in the antenna system before the receiver will cause a double degradation - the noise level will be increased because it is occurring at ambient temperature and the signal will be reduced because of the attenuation. This emphasises the importance of siting the LNA as close to the feed as possible to avoid cable losses and of ensuring that all connections are sound. Objects such as trees or buildings in the beam of the

antenna, even if not in the line-of-sight to the satellite, will contribute to the received noise level. Bear in mind that a 1 metre dish at 1.7GHz has a beamwidth of about 10 degrees. ●

THE COSMOS 1500 PICTURES IN RIG 36

John Murray mentioned some of the instrumentation onboard the OKEAN and COSMOS 1500-type spacecraft in his article in the last Journal. Geoff Perry has now sent a couple of diagrams which identify some of the instrumentation shown on the photographs reproduced on the back cover.

A few readers thought some of the pictures were printed upside-down! Perhaps some did not appreciate that the massive, annular structure at the bottom of the two images on the outside back cover was not part of the spacecraft but a structure to support it safely at the exibition.

The spacecraft consists of a large, conical structure, about 3.2m, high which contains a pressurised compartment housing control equipment and batteries. Instruments are mounted on the base of this structure as well as on four booms, each 2.9m long, extending from it. Two panels of solar cells also extend from the conical section. Two of the instrumented booms and one of the solar cell panels are visible in the top picture on the outside back cover. The instrument with the rectangular, orange antenna is the PM-08 scanning microwave radiometer and the cylindrical object just inboard from it with two cables attached is the power and control unit of the side-looking radar. This unit is also shown at the upper left corner of the lower picture on the back cover. This picture shows a close-up view of the central part of the spacecraft. Right in the centre is the optical attitude sensor. To the left is the helical antenna of the telemetry system and just below this, half of the long side-looking radar antenna is visible. Part of another boom appears in the bottom right corner and the rectangular object mounted there is the receiving antenna for the Condor-2 data collection and transmission system.

The instruments shown in the top photograph on the inside back cover are not identified in the drawing. From the scale shown, the downward-pointing off-set dish antenna is just under a metre in diameter. The purpose of the pyramidal horns at the right, which point slightly upwards into space, is not clear. The lower picture clearly shows the side-looking radar antenna and its transmitter (the white cylindrical object). Immediately beyond this cylinder lies the magnetic moment compensator and the cylindrical antenna at the end of this boom is the "antenna of transmitting radio channel of decimetric wave research data". ●

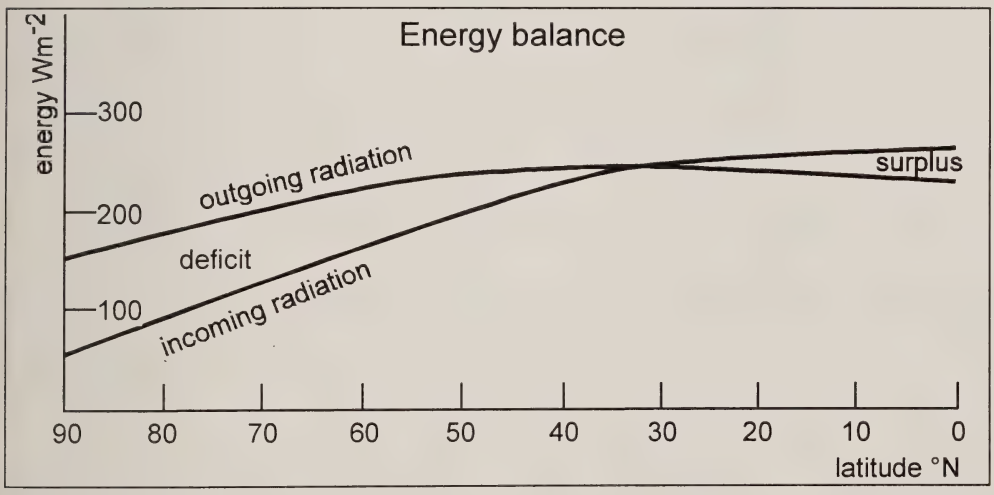
THE BASICS OF VISIBLE AND INFRARED IMAGING

Michael Gill, G6HOM

During the Easter holiday the sun made a few brief appearances between the rain, hail and snow showers. Sitting by the window in the sunlight I was reminded of what a strong source of heat and light the sun is. It brought back pleasant memories of sitting in the garden during last summer (the last two weeks in May!). If sunshine in England seems warm, the experience of Mediterranean holiday resorts serves to prove how much warmer the sunshine is at lower latitudes.

This is a strange introduction to an article about satellite imaging. Or is it? The sun is an extremely strong source of illumination and most of that which reaches Earth falls in equatorial regions between 20N and 20S. Comparatively little sunshine falls on the surface at higher latitudes. In fact, as figure 1 shows, at higher latitudes there is more heat lost to space than there is reaching the surface directly from the sun. Global weather systems and ocean currents re-distribute heat from the equatorial latitudes towards the poles.

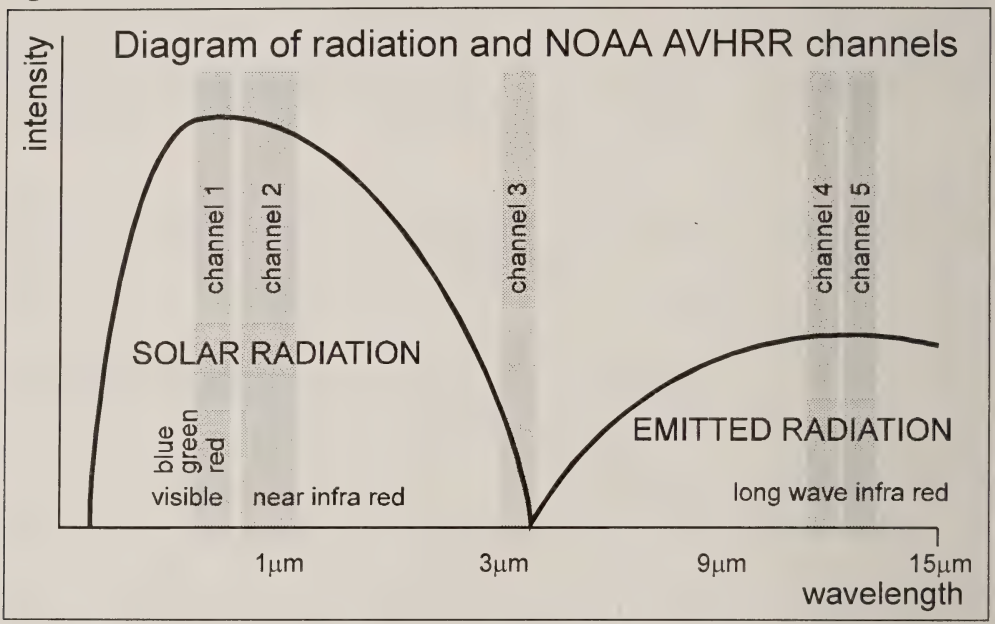
Figure 1



What is the link between heat and sunshine? How does this have a bearing on satellite imaging? The sun radiates energy throughout a wide spectrum but the greater part of this energy falls on the Earth as visible light. Sunlight falling on the atmosphere and surface of the Earth is subject to three processes; reflection, transmission and absorbtion. These three processes are of vital importance to imaging from satellites.

Images can obviously be formed by reflected sunlight and we use this effect in everyday photography and video recording and, of course, we see and read by reflected light. Whenever light is absorbed by a surface that energy is turned to heat. For example, when you lie in the sun you get hot. This heating, coupled with the short term retention of heat by the atmosphere, raises the average temperature of the planet to a habitable 15C. Just as important as the heat gained from the sun is the loss of heat into space. Over any short time interval the amount of energy received from the sun must be exactly balanced by the amount of energy radiated into space. If not, the Earth would either get cooler or hotter. Figure 2 gives a general picture of the incoming energy from the sun and the outgoing energy in the form of long wave infrared radiation (heat).

Figure 2



Imaging the planet in visible radiation alone would be very limited. One obvious problem is that you would not have any images at night and illumination, especially in winter months, is very poor at higher latitudes. Sensors receptive to wavelengths far longer than our eyes can detect allow us to make images of the planet both by day and by night from its emitted heat radiation.

The NOAA Advanced Very High Resolution Radiometer (AVHRR) is designed to image the surface of the Earth in five spectral bands. Visible, near infrared (reflected sunlight), mid infrared and two far infrared (emitted heat)

wavelengths (see figure 2). Each waveband is chosen to give the highest image contrast in the subject of interest. No satellite sensors are sensitive to blue light because blue light is heavily scattered by the atmosphere and resulting images would be of very low contrast. This is the main reason why weather satellites do not produce colour images.

The AVHRR is the primary imaging system flown on the current NOAA series of satellites. It provides the raw data for both the High Resolution Picture Transmission (HRPT) and the Automatic Picture Transmission (APT) and also, the data for the Local Area Coverage (LAC) and Global Area Coverage (GAC) modes of operation. The LAC and GAC services rely on on-board tape machines to record the digital data for selected parts of the orbit. The recorded data are transmitted to ground stations in America for processing. In this way the NOAA satellites provide some users with global coverage.

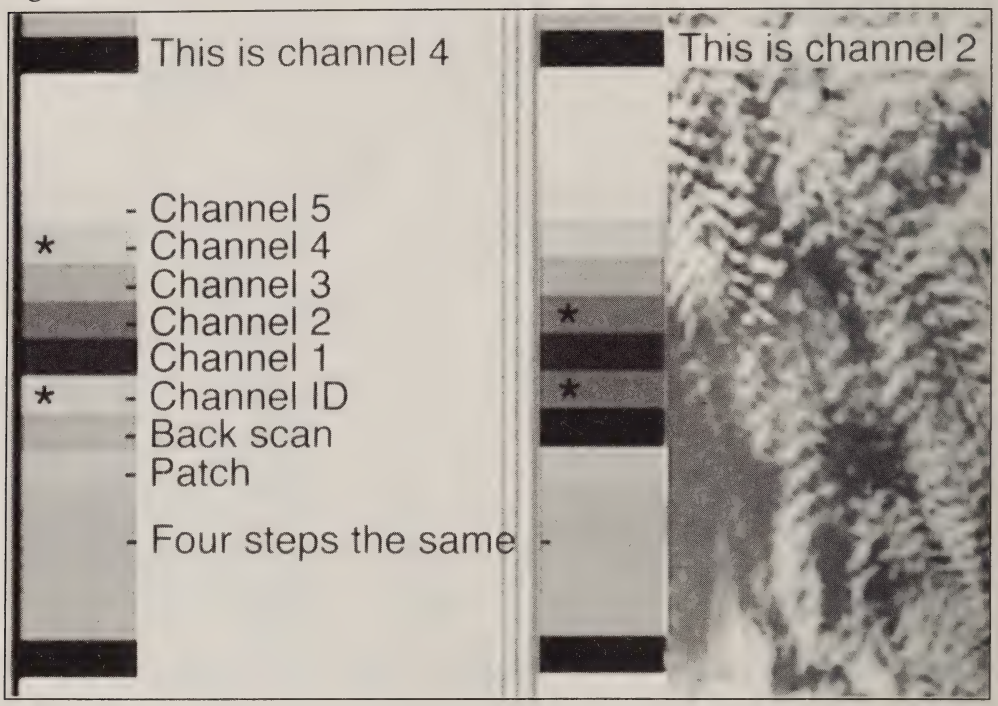
The AVHRR optical system consists of a 203mm diameter Cassegrain telescope. Reflected and emitted radiation is directed into the telescope by a scanning mirror rotating at 360 rpm. Each rotation of the mirror corresponds to a line of information in the image (HRPT). The telescope is followed by an arrangement of beam splitters that direct the incoming radiation onto five separate sensors. Each sensor is designed to respond to a different, narrow band of wavelengths. Calibration is of vital importance to a system designed for long life and unsophisticated users. Effectively, each channel is recalibrated on every revolution of the scanning mirror. Just before the Earth appears in the telescope's field of view the telescope sees deep space away from the direction of the sun. This view of an absolutely black/cold object is used as a reference. Expressed simply, the output signal from each channel is the difference between the voltage from the sensor and the voltage obtained from the reference reading.

Let's return to the three processes; absorbtion, reflection and transmission, and their effect on satellite images. Deep, still water absorbs almost all light falling upon its surface at high angles of incidence; very little is reflected. The surface layers may transmit a high percentage but, eventually, all is absorbed by the deeper layers leading to heating. High clouds reflect almost 90% of the sunlight falling on them. In images in the visible (channel 1) and near infrared (channel 2) deep, still water looks very dark grey or black and clouds light grey to white. The term ALBEDO is often used in connection with satellite imaging. Albedo is the percentage of energy reflected or scattered from a surface without a change in wavelength. The mean albedo for the Earth is 30% and varies between 90% for clouds, snow and ice to less than 5% for deep, still water. (If the water surface is disrupted by waves etc. then a significant proportion will be scattered and reflected).

In the long wave infrared (channels 4 & 5) warm water emits more radiation

than cool water so in an infrared image warm water should be reproduced as light grey and cool water dark grey. Clouds, whose tops are very cold (-60C) emit very little long wave radiation and should appear black. However, here we have a potentially confusing situation so, in order to preserve the naturally white appearance of cloud tops, the infrared images from the satellites are inverted. Black becomes white and white becomes black.

Figure 3



Now, let's look a little closer at the characteristics of the images produced by each channel. Channel 1 is the visible channel (0.58 - 0.68μm) and is dependent entirely on reflected sunlight. Generally, illumination levels need to be quite high for good images. Land/sea contrast is generally poor, particularly at higher latitudes. It is unusual to see channel 1 images on APT transmissions. (But see RIG36, top of page 70). Channel 2 (0.73 - 1.1μm) is reflected infrared. This channel is usually assumed to be the "visible" channel on APT transmissions but in fact our eyes are insensitive to these wavelengths so it should not really be called "visible". Land/sea boundaries are usually very clear and cloud detail is also very good. Channel 2 is the most used daytime channel for APT images. Channel 4 (10.3 - 11.3μm) is the long wave infrared channel and is effective both day and night. It is the channel offering good land/sea and cloud contrast during the night and is the nighttime APT channel normally used. Channel 5

(11.5 - 12.5μm), has similar characteristics to channel 4. I do not recall ever seeing a channel 5 image on APT. The wavelengths of channels 4 & 5 coincide with the wavelengths at which long wave infrared emissions from the Earth are strongest. Finally, the odd or should I say curious one. Channel 3 (3.5 - 3.9μm) is the channel that no one pays much attention to. It is odd because it can image the planet by reflected infrared and by emitted infrared. Therefore it can be used by day and by night but the images appear quite different. On early morning passes I have seen effects from both modes of illumination on the same image.

Identifying which channel is in use on APT images is relatively straightforward. First notice that there is a regularly repeating series of grey-scale steps along one side of each image. The first stage is to identify the block four grey steps that look the same brightness (see figure 3). Next, identify a series of three steps followed by an eight-step grey-scale running from near-black to white. The first of the three steps is the "patch"; a calibration level. The next is the "back scan"; a second calibration level and the third is the "channel ID" step. To identify the channel number simply match the brightness of the ID step with one of the grey-scale steps. The channel number is found by counting from the near black step (1). The pattern is easier to recognise on infrared images.

References:

NOAA technical memorandum NESS 95 1982
NOAA TIROS-N Direct Readout Services User's Guide 1982

Watching the World's Weather, W J Burroughs. Cambridge University Press. ISBN 0-521-34342-9

Principles of Remote Sensing. P J Curran. Longman. ISBN 0-582-30097-5

Atmosphere, Weather & Climate. R G Barry & R J Chorley. Routledge. ISBN 0-415-07761-3

GEOSTATIONARY SATELLITE NEWS

METEOSAT 3

This continues to operate on one channel above 75 degrees west longitude. However, it no longer remains over the equator as there is no fuel left to correct its orbit for the perturbing effects of the sun and moon. Inclination has now reached almost two degrees which means that large antennas with narrow

beam-widths may have to be moved several times a day. One advantage of this to UK members is that, even in the east of Britain, Meteosat 3 now comes above the horizon for a few hours each day. Insomniacs with a clear horizon around azimuth 260 may like to turn their dishes and try for signals. Currently, maximum elevation occurs around 0200UT. To maintain correct polarity the feed will need to be turned about 30 degrees anticlockwise (when looking into the dish).

METEOSAT 4

Meteosat 4 is currently the back-up for Meteosat 5.

METEOSAT 5

Prior to March 23 Meteosat 5 was operating to the Meteosat 4 schedule but with a slot offset of -1. ie data were 30 minutes older when disseminated. This delay was needed to computer-correct an image problem caused by a fault on the satellite. Improved software enabled this delay to be reduced to 8 minutes and a new schedule was introduced on 23 March. Further enhancements to the software in due course should result in this 8 minute delay being reduced to zero, possibly before this Journal is published. For this reason the temporary schedule is not printed in this issue.

METEOSAT 6

The anomaly in the IR and WV imaging system now seems to be a less serious problem than first anticipated. Work continues on the problem but it is likely that Meteosat 6 will take over as the operational satellite later this year with Meteosat 5 put into stand-by mode.

GOES 8

More than 7 years after GOES 7 was launched GOES 8, the first of a new generation of American geostationary weather satellites, was successfully orbited in April. Lift-off occured at 0604UT on 13th. It cost $1,052,000,000 excluding the launch, was $526,000,000 over budget and several years late. After an extensive check-out above 90 degrees west longitude it will be moved to 75W later in the year to take over from the aging Meteosat 3 spacecraft. It has 19 IR channels (compared with 12 on GOES 7), and images have 1024 grey levels. Ground resolution is 3 km at the nadir.

[News on Feng Yun 2A and GOMS/Elektro appears in Soviet and Chinese Scene on page 64]

A SIMPLE COLOUR MONITOR SWITCH

Iain Coates

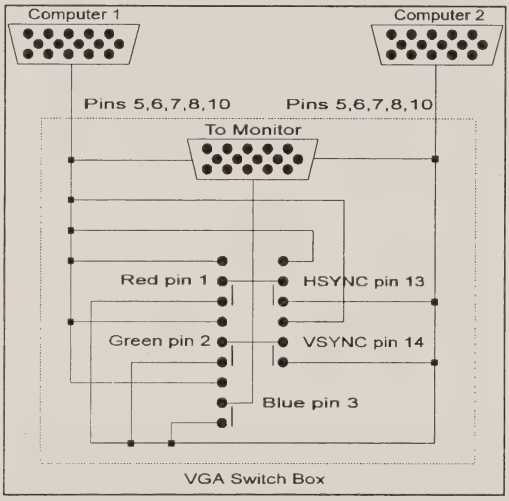
[As incorrect connections could lead to very expensive damage to monitor and/or computer, only competent persons should attempt this project. Ed]

I am fortunate enough to have access to two PCs at home. While one is being used to record satellite images I can be developing new ideas and pursuing other interest on the other.

While I have the space for two PCs and two keyboards I am not sure that I would want two monitors in the shack. I find one screen enough to look at at any one time! However, constantly switching a monitor cable from one PC to another is a little inconvenient. What is needed is a simple switch which would allow a single monitor to be shared between two PCs.

VGA monitors use high density, 15-way, D-type connectors. The function of the various pins is as follows:

1	Analogue Red colour signal
2	Analogue Green colour signal
3	Analogue Blue colour signal
5	Ground
6	Return signal for Red
7	Return signal for Green
8	Return signal for Blue
9	Key - not connected - see later
10	Digital ground
13	Horizontal deflection control signal
14	Vertical deflection control signal



Pins 4, 11, 12 and 15 are not connected.

The monitor is fitted with a plug while the VGA card is terminated in a 15-way socket. Pin 9 is used as a key and, in many VGA cards, it is blanked off. Consequently, pin 9 of the plugs must be removed. This can be snapped off by careful manipulation but you must ensure that you do not twist any of the other pins.

It is sufficient to switch pins 1, 2, 3, 13 and 14. All of the other pins may be taken directly from the two computer inputs directly to the socket for the monitor. While all of the VGA cards I have examined have pins 6, 7, 8 and 10 connected

together on the graphics board I have treated each of them separately in the switch.

The complete unit was constructed in a small box (102 x 70 x 38 mm). A 15-way, miniature, D-type socket was fixed centrally on the back of the box. Two cable exit grommets were used to feed 1 metre fly-leads from the switch to 15-pin plugs for connection to the host PCs. A 6-pole, push-button switch was used to switch between the machines. This was mounted on a small piece of paxolin secured by four nuts, bolts and spacers and aligned so that the push-button protruded centrally from the front of the box. All connections were made directly either to the solder lugs on the switch or to the 15-pin D-socket for the VGA monitor. The diagram should help to clarify the connections.

I would assume that a 6-pole, 2-way, rotary switch could be used in place of the push switch. This would simplify the metalwork and remove the need for the paxolin mount.

I would recommend the use of good quality cable for the fly leads to the computers. I used a piece of screened, 6-pair, Belden cable which I had to hand. This comprised of 6 twisted pairs wrapped in a foil sheath together with a drainwire which was grounded in the switch box. The cable was conveniently colour-coded with red, green and blue pairs which I used for the three colour signals. Yellow and white pairs were used for the HSYNC and VSYNC signals respectively.

I purchased most of the components from Maplin. I have included their part numbers for completeness although many other suppliers can provide similar components.

1	Metal box 102 X 70 X 38 mm (LF10L)
2	High density, 15 way, D-type plugs (JW77J)
1	High desnity, 15 way, D-type socket (JW78K)
2	9-way, D-type hood (FP27E)
1	Latchswitch, 6-pole (FH69A)
1	Rectangular Latchbutton, Grey (FH62S)

If you do not already have any suitable cable for the fly leads I would suggest purchasing one of the video cables from the Maplin catalogue.

WANTED

Circuit diagram or an offer of repair for a Philips PM 3110 oscilloscope.
Contact Mark Pepper on 0344 777730 evenings.

MORE ON JVFAX

Peter Dobson

Since my last article on this subject in RIG 34 and Mark Pepper's more recent contribution I have been asked numerous questions about JVFAX. I hope the following information answers some of those questions.

INTERFACING WITH JVFAX

Below is a list of interface demodulators supported by JVFAX. It has been extracted from Eberhard's document called interf.doc which comes with the programme.

A) Asynchronous Data Acquisition.

All asynchronous interfaces rely on the programme carrying out the timing for picture processing during reception.

Serial port: This is the standard method for data acquisition in JVFAX. The four incoming handshake lines (DCD, RI, CTS and DSR) are used. The program first reads in the 4 most significant data bits with the RTS line set to high. Then, the RTS line is toggled to the low state and after a (very) short delay the lower 4 bits are read.

Serial port/ser: This works exactly as above but with the difference that data are read in serially via the RXD-line of the serial port.

Comparator: Audio frequency from the receiver is shaped to a rectangular waveform by means of a comparator and fed directly to one handshake line (DSR) of a serial port.

HAMCOMM: This is just the same as the comparator interface but with the difference that the DTR and RTS lines are toggled to serve as a transmit/receive switch. The HAMCOMM interface is very popular for the reception of RTTY etc. in conjunction with the famous HAMCOMM shareware program.

Parallel port: Data are read from the specified parallel port address periodically. There's no handshake and all the timing is done by the program. The parallel port must be bidirectional. It is not always possible to configure printer ports as data input.

A&M design board, MEFAX: Both of these are plug-in cards which allow for the reception of both AM- and FM-FAX signals. Not all options of these cards are fully supported by the program, especially regarding the A&M-board which

allows for a synchronous buffered data acquisition.

Faxellite: This is the interface that SSB-electronics supplies with their excellent DIGISAT program. Unfortunately, it is thought that the interface design has changed, so JVFAX may not work with the latest version.

BPF2 (8 bit): This is to interface to the BPF2 FM demodulator interface offered by Ingenieurbüro Becker & Poth.

B) Synchronous Data Acquisition.

While all the above interfaces leave the complete signal timing to the program, the following drivers support interfaces that can deliver some kind of pixel clock in addition to the data. This gives some advantages when, for example, receiving polar orbiting satellites or when replaying tape recordings of such satellite passes. Not all these drivers have been tested.

Synchron Serial: This works the same way as the serial port/ser interfacing but with the difference that the program timing is derived from the data rate of the interface. (not the baud rate!!) Use of a 16550 FIFO UART is strongly recommended.

BidPrintPortIRQ: The same interfacing method as parallel port. Will only work on a bidirectional printer port (or a printer port modified for data input). Additionally, the ACK-line serves as a data strobe signal which must be fed with the synchronous clock delivered from the interface (active low).

BidPrintPortPoll: The same interfacing as parallel port. A parallel printer port is needed that is bidirectional or that has been made bidirectional. To use this option the demodulator must be capable of buffering at least 2 (preferably more) complete picture lines. Data are read in periodically by the program. The program will read data from the data port whenever and as long as the ACK line is kept low by the interface. For every byte read, a short pulse is generated on the strobe line. Because no tests have ever been made with this driver (due to the lack of an appropriate interface) there is doubt if it will work as it should. This interfacing technique should enable the use of the JVFAX program under WINDOWS or OS/2, so it could become more interesting in the future.

MODULATOR TYPES THAT CAN BE SELECTED FOR JVFAX 6.0

In general, every transmission by JVFAX has a maximum intensity resolution of 64 levels (6 bit). When outputting digital intensity data via a serial or a parallel port, these bits are right (LSB) aligned within the output byte, which is opposite to the demodulator side, where all data are MSB aligned.

The following 'modulators' can be used:

Speaker: Audio is generated through the PC's built-in speaker. A simple low pass filter can be used to obtain a signal that can be fed to the transmitter's microphone input jack.

Serial audio: Works like as above but audio is generated on the TxD line of a serial port. Only a reduced set of intensity levels (about 13) will be generated when using this option, since the baud rate generator of the serial port is used to generate the audio frequency. The problem is that the input clock frequency for the baud rate generator is only about 115 kHz, which leads to very coarse frequency steps being programmable. The same low pass filtering as above can be used to connect the TxD pin of the serial port to the transmitter's input.

Serial port: With this option, no audio is generated by the computer. Instead, the digital intensity information is output to the TxD line of the serial port (0 for black, 63 for white, etc.).

Parallel port: As above but data are output via a parallel port, e.g. a printer port.

JVFAX CALIBRATION

Several problems have been highlighted by various people on the operation of JVFAX. To sort out many of the problems I have described below a calibration procedure for FAX reception which will check the operation of the receiver, the computer and the programme.

FAX transmissions only carry useful information in a narrow band either side of the deviation being received, ie a bandwidth of approx 1.3KHz for 150Hz deviation and 1.8KHz for 400Hz deviation. For this reason a great deal can be gained by fitting brick wall filters between the SSB receiver and the comparator circuit which have a low corner frequency of approx 1KHz and a top corner of approx 2.7KHz. This filtering is surprisingly important and JVFAX can easily be upset when you least expect it due to co-channel interference.

First and foremost, the comparator mode of operation uses a lot of computing power and time. JVFAX will complain if other TSR programmes are being run whilst JVFAX is in operation. These programmes are called in CONFIG.SYS and AUTOEXEC.BAT at computer boot time. If you have DOS6 then a very quick test is to reboot the system. As soon as you get the 'starting DOS' prompt press the F5 key. This will cause DOS to boot without actioning either CONFIG.SYS or AUTOEXEC.BAT. Unfortunately, you will then have to find your own way to JVFAX manually and start the programme. Any batch file written to call JVFAX

is not likely to work without CONFIG.SYS or AUTOEXEC,BAT being run first. DOS will also ask you for the time and date but if you know the clock is right just hit return each time. JVFAX will now be running without anything in the way. DOS 6 also allows you to set up different computer configurations for different applications. For JVFAX that is very useful.

Once in the programme, set your receiver to a frequency where it picks up some harmonic of its own local oscillator (all communication receivers I have seen to date suffer from this problem somewhere in their spectrum!) Pick a signal with a reasonably good signal strength and which produces a very constant and pure sounding tone from the receiver output (when set to USB or LSB mode). Fine tune the receiver to give an output of 1900 Hz. Set JVFAX to FAX mode and action 'A' to start decoding. Now tune the receiver until the JVFAX histogram display shows a peak somewhere in the middle of it's range. If all is working well the histogram should be quite thin, peaking quickly and falling away quickly again. To confirm this the screen should be showing a constant half grey shade as decoding progresses. The quality of this constant signal can be measured by the slimness of the histogram peak. Increasing the receiver output tone (frequency wise) should cause the screen to show lighter and lighter shades of grey. The reverse effect is true if the receiver tone is reduced. The important thing here is that a smooth grey shade should be displayed on the screen as decoding is in progress and there should not be any glitches or noise on the display. If there is it could be that the amplitude of the signal coming out of your receiver is not enough to make the comparator clip properly. Experimentation with receiver output amplitude and with filters between the receiver and JVFAX should help eliminate any noise. The other source of noise is TSRs running with JVFAX in the computer.

Having got this far, the system will have been tested to check that the best has been obtained from JVFAX and the receiver. With these tests it should be possible to get very clean output on the screen. This has checked out everything in the shack and the only thing that can now reduce the quality of received pictures are atmospherics and outside interference. JVFAX with the comparator interface should return very good results from FAX when used with care. If Offenbach Meteo on 134.2KHz can be received then this should provide a good and clean signal. For this station I use a ferrite aerial approx 6" long which returns very good results here in the UK. I have tightly tuned the ferrite to the received frequency which helps further with reducing co-channel interference. The other important point is to experiment with filters between the receiver and the JVFAX comparator interface. For Offenbach there is a station 1KHz below which can cause any FAX programme a lot of problems. Careful filtering between the receiver and the comparator will eliminate this.

Martelec have produced a universal JVFAX interface PCB. It allows all modes of

JVFAX to be used and permits the set up of the interface card moding from the programme. The card caters for both APT and FAX input as well as handling APT Doppler shift. The card will be built into a die-cast box and plug into the PC via a serial port. Power for the interface card is derived from an integrated power supply built into a 13Amp plug. The card requires a nominal 12v supply making it readily usable in boats, cars and airplanes. ●

PRODUCT NEWS

OFS PORTABLE APT SYSTEM

[The following are brief extracts from an Internet message from Jerry Dahl <DAHL@RALVM29.VNET.IBM.COM> passed to me by Trevor Smithers. They may be of interest to members. Ed]

OFS WeatherFAX PCMCIA Convertible is a low power PCMCIA Type II "credit card" weatherfax decoder designed for Notebook and Desktop computers....Decodes Polar, Geostationary and HF Fax signals....A bus converter card is included allowing the PCMCIA card to be used on ISA bus computers....Hot-plug the PCMCIA card from your desktop computer and take it with you when you travel....The only weather fax card to use Carrier Peak Sampling technology....Noticeable image improvement, blacks are blacker, whites are whiter and grey levels are more accurately defined....The programming API will be published and end users are encouraged to port their software applications for mobile use.

TWO NEW PRODUCTS AVAILABLE FROM RIG

A 47-element Loop Yagi for Meteosat manufactured by Hibbert Electronics is now available.

1.5 metre cables to connect Timestep's PROscan receiver to the PROsatII card are also available now. See RIG Shop Corner in this issue for prices. ●

FOR SALE BBC-B Issue 7 Computer with ROM/RAM board and extra 16K RAM and Memory, 40/80 Disk Drive and additional ROMs and User Port Switch.

TIMESTEP 3-0 Interface for above, professionally built and cased with integral RX switched for NOAA crystals (Meteor crystals also).

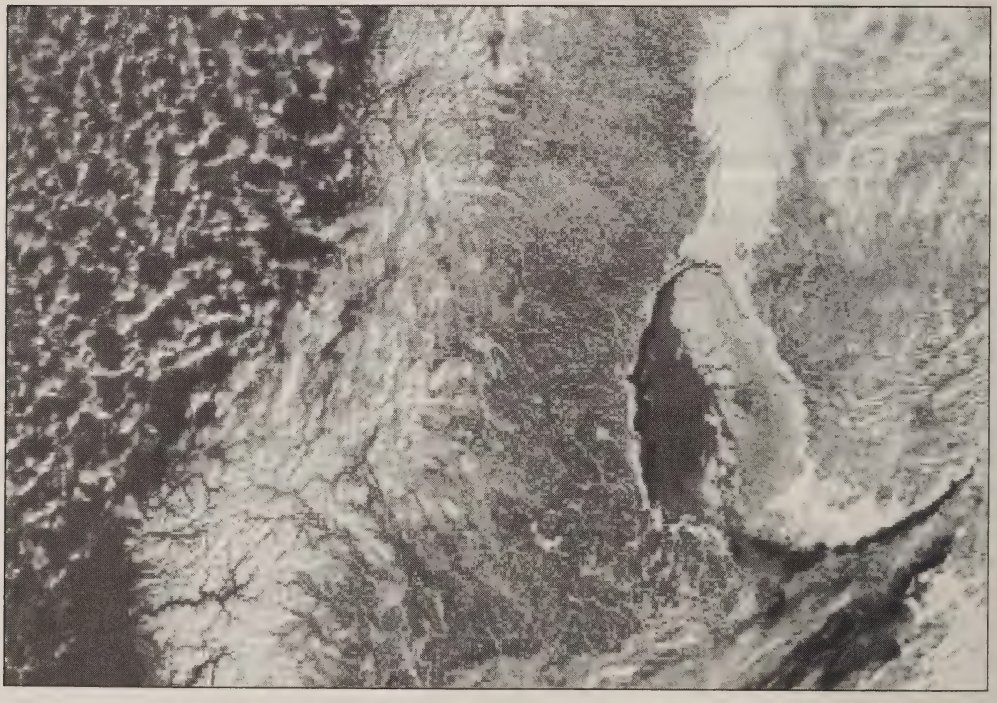
YU3UMV Framestore with A-D converter very neatly built and cased. All above with circuits and documentation. Offers to W Lankshear G0HFB, 57 St George's Road, East Looe, Cornwall. 0503 262823

THE SOVIET & CHINESE SCENE

PETER WAKELIN

Throughout the last few months at least one of the METEORs has been imaging in the daytime but there has been no IR imaging for quite some time. METEOR 2-21 seemed to improve its signal strength before precessing into the dawn in early March and several members reported good imagery of Scandinavia during February. There is no doubt that the Winter Olympics increased the interest in imaging this part of the world, especially as the weather there was dominated by the "Lillehammer High" throughout the Games. Day after day of cloudless skies and bitterly cold nights persisted for several weeks. Ice in the Gulf of Bothnia was far more extensive than in recent winters and the accompanying image shows the ice near its maximum extent in late February. From the numerous 'phone calls I had during this period it was clear that many people had not appreciated how much better the METEOR images are in conditions of low illumination compared with those from the NOAAs. Now that NOAA 11 has precessed so far east, and passes so late in the afternoon, we are dependent upon METEORs for winter vis imagery at high latitudes.

Meteor 2-21 25 February 1994 0915UT



METEOR 3-5 took over from 2-21 and is still imaging now (5 May). The south-bound passes have precessed to very early morning but with increasing seasonal illumination at high northern latitudes the images of the Arctic area are still very good. The switch-on latitude of the evening north bound passes is edging south so I would not be at all surprised if this satellite doesn't continue to operate until well after the summer solstice, even though METEOR 2-21 has just been switched back on. The latter is now on 137.40MHz but it's signal strength is very low again.

METEORs 3-3 and 3-4 may still be in working order but the latter has been silent for 9 months now. 3-6, the newest one, is no doubt still operational and will be called upon when required.

Ever since 1977 the Russians have been committed to launching a geostationary weather satellite to fill the gap between Meteosat and the Japanese GMS. Initally known as GOMS and now renamed Elektro, it would be stationed over the Indian Ocean to the south of Sri Lanka. Rumours of its pending launch have been heard many times but now a report from the Reuters news agency, dated 18 April, quoted Pavel Zybin, an official at the Russian weather monitoring service Rosgidromet as saying that the Elektro satellite could have been launched last year had the money been available. He went on to say "The Elektro and booster are still in Moscow and I do not know when they will be delivered to the Baikonur cosmodrome" The Reuters report continued; "Academician Yuri Trifonov, in charge of the project, told Izvestia newspaper last week he was not sure the launch would take place soon since the satellite had been lying idle for some time and needed to be thoroughly checked." I am grateful to Geoff Perry for passing this Reuters report to me.

Geoff also passed me a press release issued by the China Great Wall Industry Corporation which he received from Sven Grahn of the Swedish Space Corporation. I will quote the first paragraph in full:

"In the morning of April 2, 1994, a final general check-out on the Feng Yun-2 (FY-2) meteorological satellite (filled with propellants) was being conducted at the Spacecraft Test Hall (BS2) of the Xichang Satellite Launch Center. Almost at the end of the testing, a fire suddenly broke out and an explosion happened to the satellite. The Spacecraft Test Hall (BS2) and some of the ground test equipment were seriously damaged by the accident. There were thirty two (32) persons injured by the accident. Immediate rescue measures were taken after the accident and those injureds were timely air transported to Beijing for emergency treatment. Only one of the injureds was dead after the emergency rescue and medical treatment in Beijing because of his severe injury. All other people are recovering and some of them have been rehabilitated."

KEPLER ELEMENTS

NOAA9
1 15427U 94125.84518822 0.00000031 8089
2 15427 99.0570 175.8303 0015115 343.2996 16.7678 14.13611551484365
NOAA10
1 16969U 94125.88441476 0.00000029 7070
2 16969 98.5081 136.1764 0014034 90.8018 269.4770 14.24882212396580
NOAA11
1 19531U 94125.86746860 0.00000092 6261
2 19531 99.1703 113.7463 0010794 253.4829 106.5157 14.12981639289243
NOAA12
1 21263U 94125.91785490 0.00000149 17
2 21263 98.6203 154.6203 0013252 3.9438 356.1850 14.22399871154526
MET3-3
1 20305U 94126.19833299 0.00000044 364
2 20305 82.5520 299.0119 0007901 40.7955 319.3673 13.04425218217420
MET3-4
1 21232U 94125.22936710 0.00000050 6913
2 21232 82.5450 199.9590 0012139 298.5027 61.4870 13.16461976145704
MET3-5
1 21655U 94125.43238540 0.00000051 7003
2 21655 82.5534 146.9426 0012670 311.0195 48.9825 13.16829774130835
MET3-6
1 22969U 94123.40567095 0.00000067 546
2 22969 82.5581 87.8533 0016414 21.5944 338.5874 13.16720458 12956
MET2-21
1 22782U 94124.23599147 0.00000061 2933
2 22782 82.5467 241.2542 0022783 353.1737 6.9124 13.83005015 34012
Above elements from Timestep BBS

Frequencies: NOAAs 9/11 137.62MHz, NOAAs 10/12 137.50MHz
METEORs 137.30, 137.40 or 137.85MHz

Explanation of elements format above:

Line 1: NORAD catalogue number, Epoch, Decay rate (NDOT/2), Bulletin number (thousands omitted), Checksum (1 digit).

Line 2: NORAD catalogue number, Inclination, Right Ascension, Eccentricity (decimal point omitted), Argument of perigee, Mean Anomaly, Mean motion (8 decimal places), Rev. number, Checksum (1 digit).

MEMBERS' LETTERS

Dear Peter,

I wonder if there is the expertise amongst the RIG membership to solve a problem where the combined "brains" of IBM have failed.

I have been trying to run PROsatII under OS/2, the purpose being to use the multitasking facility, so that animation sequences from Meteosat can be collected in the background whilst the computer is used for other purposes.

Whilst all the PROsatII programmes work OK in a DOS window, and all the processing and animation proceedures work, both VGASAT and PCANIMAT lock up as soon as data are applied from the receiver. The OS/2 continues to function. I understand from IBM that the problem lies in the time-slicing used by OS/2, and the fact that the PROsatII card uses Direct Memory Address (DMA3 on H310 and H311).

Can anyone suggest a hardware or software solution, such as getting the PROsatII card to use an IRQ, such as COM3 or COM4, or another interrupt?

On a slightly less technical matter, I have another problem. I recall, a number of issues ago, that a member had trouble with a spider in his feed-horn. My problem is larger. Can anyone suggest a remedy for fading signals due to a large, black Labrador basking in the reflected heat of a patio-mounted dish?

Yours sincerely,

Paul Adamson, 45 Woodfield Park Road, Emsworth, Hants, PO10 8BE

Dear Henry,

Just a note to say thanks for your quick response to my request for one of the RIG 10.7MHz, 38kHz B/W, crystal filters.

I have now rebuilt the front end of my receiver on similar lines to that suggested by Ray Godden in RIG 35, but I used a 3SK88 followed by a 40673 instead of BF961s as I just happened to have these in my spares box.

I can now receive horizon to horizon interference-free signals on all polar-orbiter frequencies. Recently 137.85 MHz had become completely unuseable due to

Pager interference.

Thanks again, Yours sincerely,

Tom Bratton, 9 The Headland, East Goscote, Leicester, LE7 3QT

Dear Peter,

I was both intrigued and surprised to read the article by John Murray concerning the apparent image section seen occasionally in OKEAN and COSMOS images in recent years. At the risk of ruffling a few feathers, I can add a few notes on my own experiences.

From the mid-eighties onwards I recorded dozens of images from the all-too-infrequent transmissions from various COSMOS, then OKEAN satellites. I documented some of my experiences and findings in earlier editions of the RIG journal. I became fascinated with the apparent unpredictability of the content of the APT telemetry received from these birds. At the time, I visited Adrian Buchan in Brixham and he told me a little of their history.

Software for decoding COSMOS passes was not as sophisticated then as it is now, and in any case, I had only a framestore. Consequently, I stored a large number of images in the raw audio signal format. I have retained them to this day.

On several occasions I noticed the blank section often seen in COSMOS images. I then re-ran the tape and adjusted the black-and-white levels to optimise the image for this section. Sometimes it was genuinely blank, but on a few occasions there was a definite image. Despite critical examination of these I could not see any obvious relationship between the faint outlines revealed in this dark section and the adjacent imagery.

I try not to hog interesting data and results, and I wanted to ask the experts some questions, so I wrote to Geoff Perry and received a most interesting reply concerning earlier weather satellite events. Unfortunately, this brief correspondence ended somewhat abruptly when, in response to a further query a year later, he replied with a request that I did not write to him again. Consequently, I merely logged my findings and left it at that.

Since those days I have, from time to time, logged early transmissions or transmission changes from METEORs. I have seen various announcements made concerning "first observations". Without a proper "collecting house" for such data it may not always be accurate, and I have seen more than one

statement on a BBS circulating incomplete information. Anyway, I am pleased to see, finally, that a fellow enthusiast has confirmed my earlier observations of this strange, and so-far unexplained, section of COSMOS/OKEAN imagery.

Yours sincerely,

Lawrence Harris, 5 Burnham Park Road, Peverell, Plymouth, PL3 5QB

Dear Henry,

I must write to say thank you for your efforts in producing the RIG 1695 MHz Low Noise Amplifier kit that you recently sent to me.

It was not too difficult to build and works a proper treat. The only difficulty I had was spurious oscillation cured by the judicious placing of pieces of conductive, foam rubber. The Timestep SNOISE programme was a great help in curing this. I now have a S/N ratio of 37-40 dB instead of 27-28 dB. I never knew the input arrangements from my 90cm dish were so poor!

The Meteosat images using the RIG/Timestep PROsatII system are now a revelation. Many thanks to all concerned.

Yours,

Peter Norman G6UEI, 20 Meadow Close, Budleigh Salterton, Devon, EX9 6JN.

BULLETIN BOARDS

Orbital elements and other information of use to members are available from several electronic bulletin boards. The three listed below all offer free service and are available 24 hours a day. In addition to orbital elements (in both Amsat and NASA 2-line formats), the RIG and Timestep services include regularly updated weather satellite status reports indicating which ones are transmitting and their frequencies. The RIG board also offers a range of shareware programmes.

Telephone numbers:	RIG BBS	0945 85666
	Timestep BBS	0440 820002
	Dartcom BBS	0822 88249

In each case the protocol is the normal 8 bit, no parity, 1 stop bit. ●

SHAREWARE CORNER

LES HAMILTON

One of the pitfalls to be avoided when working with self-extracting archives is inadvertently performing the extraction from the root directory of a hard disk. It's something we've probably all done at some time or another (I certainly have) and it results in the files being scattered throughout the root directory. I recently heard from one RIG member who expanded VPIC, only to find the hard drive liberally peppered with upwards of 30 files. Of course, it is essential to create a sub-directory for the archive first and to expand it inside that sub-directory.

Anyway, in an attempt to make the RIG Shareware Library as "bomb-proof" as possible, I have recompiled all the archives in such a way that they can now be expanded directly from any root directory (C:, D:, E: etc.), and will automatically create a sub-directory before expanding into it. Additionally, I have created a README file for each Shareware Library Disk, listing the archives, and also the name of the sub-directory that each will expand into. The file also contains brief notes on how best to load each archive.

In the interests of economy, it is unnecessary to publish the entire Shareware Catalogue in every edition of the RIG Journal. Following the full listing in the January journal, which all members already have, subsequent issues this year will list only the additions. However, I have prepared a catalogue file, (CATLOGUE.EXE) of all titles in the RIG Shareware Library which lists each program, disk by disk, along with a brief review of each. This is included on some of the disks, space permitting. Any member wishing a copy is welcome to send me a blank, formatted disk marked "Shareware Catalogue", with return postage and packing, for an up-to-date copy.

Shareware Reviews

SATCOM - is a program from Stefan Bierfreund of Lübeck in Germany, which provides a host of utilities based on NASA 2-line elements files. Additionally, the program has the special feature that it can interface with JVFAX and WEATHERFAX by way of an automatic scheduler. SATCOM does everything imaginable from calculating the pass times of satellites, depicting ground tracks on a World map or from orbit, calculating sunrise/set, presenting tables of ephemerides etc. etc. With an appropriate interface, SATCOM will rotate your antenna to follow a satellite. The documentation is in German, with notes in English, and the ALT-F3 key combination toggles on-screen instructions between German and English. This is a fascinating program, and well worth investigating, since it has something for just about everyone. [Disk C-01]

SSTV-FAX - Earlier this year, Ben Vester wrote an article in "QST" describing a software system for the transmission and reception of slow-scan TV/FAX480/Wefax. Since the system is almost entirely software based, only a simple clipper interface is required between your receiver and computer. The program is written in GWBASIC and is aimed at the experimentally inclined who are not scared to dabble in simple BASIC programming. The programs have been made available gratis to RIG members by the author and are available in the archive SSCAN.EXE on Disk C-01.

FIXTIME - is an excellent utility for adjusting your computer's internal clock for drift. The utility is best invoked via your AUTOEXEC.BAT file. FIXTIME is not a TSR, so should not conflict with other software. Once the program has been installed, clock drift is easily corrected by typing commands such as "fixtime -5" (which compensates for a 5 second gain) or "fixtime 7" (which corrects a 7 second deficit) at the DOS prompt. Everything is explained in a four-page README file. After a few corrections several days apart, the utility works very effectively and is well worth the $10 registration fee. [Disk U-01]

GIFPALET - For those of you who wish to alter the background colour of your GIF images, GIFPALET is a small DOS utility which does the job nicely. Just type GIFPALET GIFIMAGE (where GIFIMAGE is the name of your GIF file) and the screen displays the entire colour palette as a grid of coloured squares. To select your background colour, just click with the cursor on one of these squares and the GIF file is re-saved with its new background. [Disk I-01]

PRODIAGS - is a tool for the advanced PC user, which can test the computer's comminucation lines, printer handshaking, cable wiring, interrupt vectors, device handlers and the 6845 video registers. The program should prove useful to those undertaking their own interfacing with JVFAX. [Disk U-01]

SKYVIEW V 1.00 - is a very easy to use, basic, planetarium program for Windows. It can show the night sky for any date between years 1900 and 2100 and allows selection of a limiting stellar magnitude down to 6.4. The night sky can be drawn as seen from anywhere on the Earth's surface and the user has full control as to whether the ecliptic, celestial equator etc. are shown. All features, including individual planets, can be colour-coded by the operator and there is a convenient option to correct for daylight-saving time. This program is freeware. [Disk A-03]

WINSTORM V 1.21 - is a program which tracks hurricanes and tropical storms over a scrolling map of the Caribbean and the Eastern American seaboard. It also allows log files to be created for new storms. [Disk U-01]

WINECJ V 1.1 - The main, unsolved problem relating to last quarter's article on JPEG compression was the length of time it normally takes to decompress a JPEG image for viewing. Now, from Australia, comes WINECJ, a really fast JPEG viewer. This Windows utility generally loads JPEG images as fast as any Windows GIF viewer and is certainly a major step forward in this field. WINECJ does not offer much more than this viewing facility though you can zoom, in or out, and convert to greyscale. The True Colour and Dithering options are only available on registering ($30 Australian). The shareware version is FREE ! [Disk V-01]

Upgrade News

First, a cautionary note regarding GSIP [Disk I-02]. I stated in RIG 35 that this item was free. However, I now have the full documentation and note that there is a modest $12 registration fee.

RIGHTIME is now up to version 2.58A. Compatibility problems have been reported when running RIGHTIME with DOS 6.2. Hopefully, this may be overcome in this new version.

VPIC now in version 6.1 handles the TIFF file format for the first time.

IMDISP has minor updates and is now in version V 7.9E.

IMPROCES has minor updates and is now in version V 4.1.

TRAKSAT has had a complete re-write (V 3.02) and now operates entirely via the mouse and a system of attractive pull-down menus. Well worth upgrading.

PAINTSHOP PRO has had a major upgrade to version 2.01. PaintShop Pro is a Windows program that will display, scan, alter, print and convert images. PSP supports 23 of the most common bitmap formats, including JPEG and Kodak Photo CD. Altering includes palette manipulation, dithering, resizing, cropping, applying filters and MUCH more. PSP supports all TWAIN-compliant scanners, does screen capturing and is an OLE server. Winner - 1992 Shareware Industry Awards. The program is now so large that it has a disk to itself. [Disk I-04]

Once again, the reviewed shareware is offered till the end of August, as the RIG-37 compilation disk.

June Additions to the RIG PC Shareware Catalogue

Disk A-02	LUNAR ECLIPSE V 1.2
Disk A-03	*SKYVIEW V 1.00 (New disk)
Disk C-01	SLOW-SCAN
	SATCOM V 4.44
Disk I-01	GIF PALETTE
Disk I-04	*PAINTSHOP PRO V 2.01 (New disk)
Disk U-01	*WINSTORM V 1.21
	FIXTIME
Disk V-01	*WINECJ
Disk RIG37	All the above (except PAINTSHOP PRO)

Applications requiring Microsoft Windows are indicated by an asterix (*)

How to Obtain Copies of the RIG Shareware Library Disks

Send up to a maximum of 6 formatted 1.44 Mb MS-DOS 3.5" disks per request to Les Hamilton, 8 Deeside Place, Aberdeen AB1 7PW, Scotland.

Disks must be sent in a sturdy, resealable package such as a padded Jiffy bag (or a package within a package) and each separate request must be accompanied by:-

i) a self-addressed adhesive label
ii) stamps for the return postage
iii) coins (or additional postage stamps) to the value of £2.

Note that overseas members' return postage is free but we would appreciate an exchange of shareware or satellite images in lieu.

Please send any new and updated versions of useful shareware to me at the above address. If you have any problems running any of the shareware from the RIG Library, please enquire by letter and I'll do my best to reply by return.

Note: Orders received in early June will not be dispatched before Monday the 13th of June.

WANTED

AMIGASAT V2.0 by a pensioner to get back into the hobby now that withdrawal symptoms have taken over after the BBC has been pensioned off. Trevor David, 19 Sandilands, Chipstead, Sevenoaks, Kent TN13 2SP. 0732 456536

RIG GIF LIBRARY

PETER WAKELIN

I have despatched about 200 disks in the last three months, including quite a few of the new starter-disk, number 100. Several of the latter have gone to members who are not yet receiving images of their own but want to see what it's all about. My apologies for omitting the cost of disks in the last issue. This led to a few new members, who didn't have earlier journals to refer to, having to make telephone calls to ascertain prices. However, they did gain an extra disk.

The most popular disks continue to be the HRPT ones and those with images of far-away places. I would like more of the latter and will send a disk of European images in exchange for images of distant lands. In response to demand I have made up another disk, number 128, from my own HRPT images, this time solely of the British Isles. I have been asked for polar-orbiter images of Africa but am unable to oblige. We have no APT or HRPT images of Africa except for the extreme North. I have, however, made up a disk, number 129, from PDUS imagery from Meteosat 5 utilising the AV format. This is the big file, around 28MB, which comes down once a day and gives a resolution almost as good as APT over much of Africa.

In response to my earlier request I have received a few NOAA 13 images, including one of eastern Australia from Peter Williamson, VK4AWP. Some of these are available on disk 130.

Disks available are as listed in RIG 36 plus the following:

128 British Isles, HRPT	Peter Wakelin
129 Africa, PDUS, Meteosat 5	Peter Wakelin
130 NOAA 13 images	

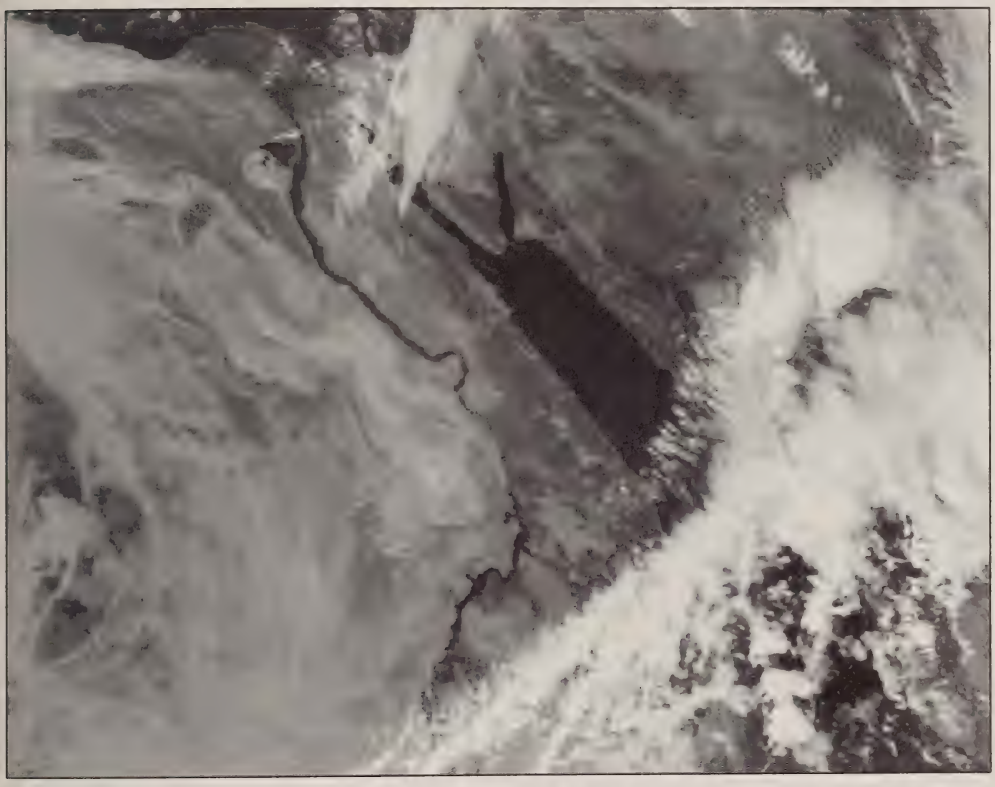
Here's How to Obtain Your Disks

The cost is £2 for the first disk plus one pound for each additional disk with no limit to the number ordered. RIG provides disks, packaging and postage. For small orders, UK members may prefer to send postage stamps rather than write cheques for small amounts.

UK members: Cheque or postal order made payable to Remote Imaging Group and sent to Peter Wakelin, 1 Charters Road, ASCOT, Berkshire, SL5 9QF. There is no credit card service for members in the UK.

Other Members: Bank Draft (in Sterling and drawn on a London-based bank) or Eurocheque made payable to Remote Imaging Group and sent to Peter Wakelin at the above address. Overseas members may prefer to pay by credit card in which case orders (which will be subject to a 3% surcharge) should be sent BY MAIL to Mark Clarke, 9 Park Lane, Bulmer Tye, SUDBURY, Suffolk, CO10 7EQ, UK. ●

The image below is a sample of what is available on disk 129.



THE ARCHIMEDES IMAGE LIBRARY

As there have been only two requests for images in the last six months this service has now been discontinued. The more recent Archimedes machines are fitted with high density drives and are capable of reading PC formatted disks. Only users of the older Acorn computers would now lack the ability to read PC GIF Library disks directly without conversion. ●

RIG AT RALLIES

For those members who are not radio amateurs, a brief explanation of the term "Rally". These are events normally organised by local radio amateur clubs and societies and are held in schools halls or just outside town in marquees in local fields. There is normally parking space provided and a small entrance fee is normally charged.

They consist of trestle tables containing new and used equipment and components, from traders in the electronics and computer field, often at knock-down prices. (Many resemble the familiar car boot sale.)

There are also displays and demonstrations by radio related societies and organisations (such as RIG). They normally start at 10.00 or 10.30am and fizzle out at around 4.00pm. They are normally signposted from the town in question by small signs attached to road signs, etc. reading "Radio Rally", "Rally", or the initials of the society, such as "ERAS", etc.

***IMPORTANT**... If you visit a rally in order to purchase RIG goods please give Henry a ring a couple of days before, so that he can put them on one side for you, as only small quantities are normally taken.*

We hope to attend the following...

June 5	Springfields, Spalding, Lincolnshire
June 12	Elvaston Castle, Derbyshire
June 26	Longleat, in grounds of Wildlife Park
July 2/3	Hamfest Stafford
July 3	York, Racecourse
August 7	Woburn Abbey, Bedfordshire, in the grounds
September 11	Lincoln, Showground
September 11	BARTG, Sandown Racecourse, Esher, Surrey
September 25	Peterborough, East of England Showground
October 28/29	Leicester, in the Granby Halls (2 days)

We are always pleased to see volunteer members at these rallies, especially those who live locally to the event, who can help out on the RIG stand for a short while and give the regulars a break during the day.

RIG HELPLINES

General enquiries Meteosat information NOAA information Supplier complaints	John Tellick	081 390 3315

A copy of the Group's rules can also be obtained from John Tellick

Russian and Chinese satellite information	Peter Wakelin	0344 23200
HRPT	Peter Wakelin	0344 23200
PDUS	James Brown *(not available on Sundays)*	0656 782632
Schools/educational co-ordinator	John Tellick	081 390 3315

Schools/educational enquiries	John Murray	Torquay	0803 217754
	Frank Bell	Godalming	0483 416897
	Tom Walter	Reading	0734 871330
	Bob Coombes	Haslemere	0428 642930
	John Din	Bristol	0454 773387
	Alan Wright	Norwich	0603 713449

Framestore technical support	Mike Coombes *(7.30pm-9.30pm)*	0530 243494

Microcomputer specialists:

PC and printer problems	Mark Pepper *(10-1pm Mon-Fri. Ask for Rob Pepper on Ext. 2132)*	0494 471111
BBC microcomputer	John Tellick	081 390 3315
Commodore Amiga	Chris Pretty	0420 82752
Archimedes	Tom Walter	0734 871330

NOTE: We are grateful to the above members for offering their services to the Helpline. Please do not abuse the service by ringing them for queries other than those listed against their names.

REMOTE IMAGING GROUP
RIG SUBSCRIPTION - NEW MEMBER

If you would like to become a member and receive the Journal, photocopy this page, complete the form below, sign the declaration and send it to...

RIG SUB, PO BOX 142, Rickmansworth, Herts, WD3 4RQ, ENGLAND

The subscription rates for 1994 are...

UK membership	£10.00	Europe outside EC	£12.00
Europe EC	£12.00	Outside Europe	£14.00

Name _____ Call Sign (if any)_____

Address. _____

_____

_____Post Code_____

Country _____ Telephone No._____

Are you receiving:
Polar-orbiting Weather Satellites _____ Geostationary Weather Satellites _____

Do you require back issues? (see Rig Shop Corner) _____

Amount Enclosed £_____

Are you willing to have your name/address made known to members in your area? YES / NO. *(Delete as applicable)*

DECLARATION: I do NOT object to the Remote Imaging Group holding my Membership details on a computer.

Signed _____ Date _____

RIG SHOP CORNER

ALL PRODUCTS ARE FOR SALE TO RIG MEMBERS ONLY, FOR THEIR OWN PERSONAL USE AND NOT FOR SELLING-ON.

IN THE EVENT OF PROBLEMS WITH EQUIPMENT PURCHASED FROM RIG PLEASE CONTACT RIG IN THE FIRST INSTANCE AND NOT THE MANUFACTURER.

All prices shown include post and packing except where marked

Receiving Equipment	**UK/EC Price**	**Overseas Price**
RIG DARTCOM Meteosat Downconverter. Assembled and tested module in tin plate box	£155.00	£132.00
Complete, assembled and mounted in weather-proof box.	£190.00	£162.00
RIG DARTCOM VHF Scanning Receiver. Assembled and tested module with LED channel number display.	£135.00	£115.00
As above but with LCD frequency read-out instead of LED channel number display. *Both the above items are modules and require a box, together with several components, switches, etc.*	£179.00	£152.00
RIG TIMESTEP PROscan Receiver. *See advert in this issue.*	£191.00 *Special Rally Price £185.00*	£163.00
RIG VHF Preamp. Includes a bandpass filter and is ideal for mast-head mounting. Assembled/tested module; needs boxing.	£18.00	£16.00
RIG TIMESTEP VHF Preamp Built and tested, in diecast box, 12vdc coax-fed	£24.00	£20.00
RIG 1695MHz Low Noise Amplifier kit. *Experienced constructors only.*	£29.00	£25.00

Computer Software/Hardware	**UK/EC Price**	**Overseas Price**
RIG TIMESTEP PROsat II, IBM/PC Compatible System.	£100.00	£90.00
	Special Rally Price £98.00	
PROsat/PROscan connecting lead	£10.00	£9.00
	Special Rally Price £8.00	

Antenna systems

RIG CROSSED DIPOLES
A Turnstile type design, in kit form *(available in UK only)* incl. P&P — £26.00
Special Rally Price £20.00

RIG/TH2 47-element YCV loop Yagi (1.7GHz) — £80.00 *(UK Only)*

DISHES *(Available in UK only - Prices do NOT include P&P, see below)*
1.0 Metre (dish only), nearly new condition — £25.00

Dish Feeds — £25.00

The above dish prices are for collection from the Chairman, or by prior arrangement at rallies or exhibitions. (Please ring the Chairman for details of availability of dishes and feeds).

RIG Binders

Available by post from Gordon Fleming, 168 Blythway, Welwyn Garden City, Herts. AL8 1DU. UK Price £4.00 each, EC/European Price £4.50, Outside Europe Price £5.00. Cheques to *"REMOTE IMAGING GROUP"* please.

Back Issues of RIG Journals

		Rally Price	UK Price	EC/Europe Price	Outside Europe Price
RIG 8-11	1987	£4.00	£5.00	£6.00	£7.00
RIG 12-15	1988	£4.00	£5.00	£6.00	£7.00
RIG 16-19	1989	£4.00	£5.00	£6.00	£7.00
RIG 20-23	1990	£5.00	£6.00	£7.00	£8.00
RIG 24-27	1991	£5.00	£6.00	£7.00	£8.00
RIG 28-31	1992	£5.00	£6.00	£7.00	£8.00
RIG 32-35	1993	£5.00	£6.00	£7.00	£8.00

Note: Prices quoted are for a set of four, including Post and Packing.

RIG 1-7 are currently out of print. Owing to depletion of some issues, photocopies may be supplied. Individual issues are no longer available (hardship cases excepted).

Ordering Information
All items are available from the Chairman, Henry Neale (except where marked) and include return by UK 1st class mail (except dishes and Journals). Items to non-UK addresses sent via airmail.

UK VAT is now applicable on sales to the following EC countries - France, Germany, Belgium, Portugal, Spain, Republic of Ireland, Denmark, Italy, Luxembourg, Netherlands, United Kingdom (including Isle of Man). Members in these countries should use UK/EC price when ordering. EC members who are registered for VAT must forward their VAT registration No. to the Treasurer to enable them to receive VAT exempt goods.

As UK/EC prices now include VAT where applicable; receipts will be issued upon request. Remote Imaging Group VAT Registration No. 594 7483 83. Channel Isles: divide by 1.175 to remove VAT content.

UK members, By Cheque or Postal Order. **Overseas members,** Pay by Bank Draft (drawn on a UK London-based bank) or Eurocheque(s). (Payments to a Maximum of £100.00 in any one Eurocheque). No local currency please.
All cheques made payable to *"REMOTE IMAGING GROUP".*

Owing to increases in postage, insurance and other costs we regret that some prices have had to be increased.

Credit Cards Accepted (Access/Visa/Mastercard/Eurocard) Add 3% to Total. Available by MAILORDER only from the Treasurer, Mark Clarke, 9 Park Lane, Bulmer Tye, Sudbury, Suffolk, CO10 7EQ.

Please state type of card, Card No., Expiry Date.
All Credit Cards authorised before goods are despatched.
(Note: Ordering by Credit Card does not mean instant despatch!)

UPGRADES...

PC-SAT3 to PCwSatIII Update disk. Dec. 1992, as mentioned in RIG24, incl. MET3-4. £3.00 handling charge, state disk size required.

PROSAT-II Update disk. Now includes the addition of country outlines. £15 including P&P. 3.5" disks sent unless advised to the contrary.

SNOISE, Signal to noise measuring program for Meteosat (for ProsatII system only) Send disk and return S.A.E.

TIMESTEP HRPT DEMO DISK, 1.4Mb. £3.00 handling charge.

OFS WEFAX DEMO DISK, 1.4Mb. £3.00 handling charge.

All upgrades available only from the Chairman.

THE COLOURED IMAGES IN THIS ISSUE

Front cover: This image was received from Meteosat 5 on 27 April 1994 at 1130UT by Peter Wakelin. It is not multispectral but the single visible channel has been coloured. Blue was allocated to the darkest pixels (water), the very lightest greys (cloud and dry, sandy soil) were coloured white to yellow and the darker greys (mainly vegetation but also some darker ground) coloured green.

Inside front cover: This APT image was received from an extremely low elevation in the south by Mike Smith, G7SDD, in Sherborne. It shows that, even with very simple equipment, almost noise-free images can be received from near the horizon when conditions are good.

Inside back cover: This 3-channel combined image was made by Peter Wakelin from a NOAA 9 image received at 0855UT on 5 May 1994. It has been coloured to make it appear 'natural'. The differences between Ch1 and Ch2 have been used to enhance the differences in vegetation; the darkest being mainly forest and the lighter shades open land. Compare the resolution of this image with the one on the back cover.

Back cover: This image and the following text have been reprinted from ESA Bulletin dated August 1993.

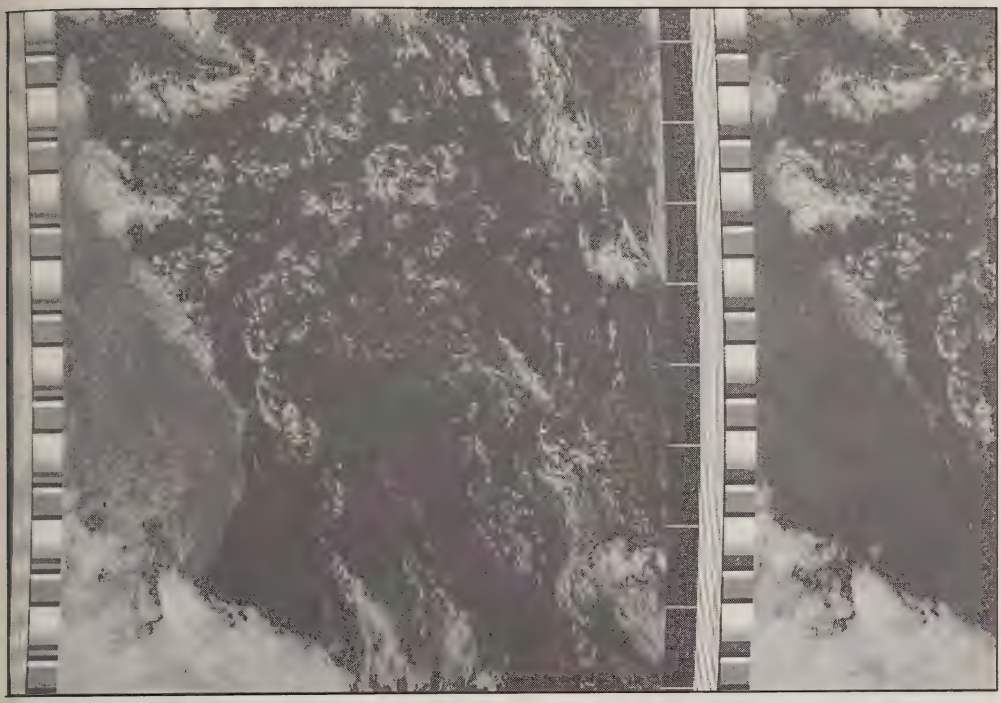
Japan's Earth Resources Satellite 1, launched by NASDA on 11 February 1992, carries a synthetic aperture radar (SAR) and optical Sensor (OPS) instrumentation. The latter is a high-resolution radiometer that measures solar radiation reflected by the Earth's surface in the visible, near infrared and short-wavelength infrared. ESA has access to JERS-1 data via the Ground Stations at Fucino in Italy (OPS and SAR acquisition), Kiruna in Sweden (OPS only), Tromso in Norway and DLR's O'Higgins Station in Antarctica (SAR only).

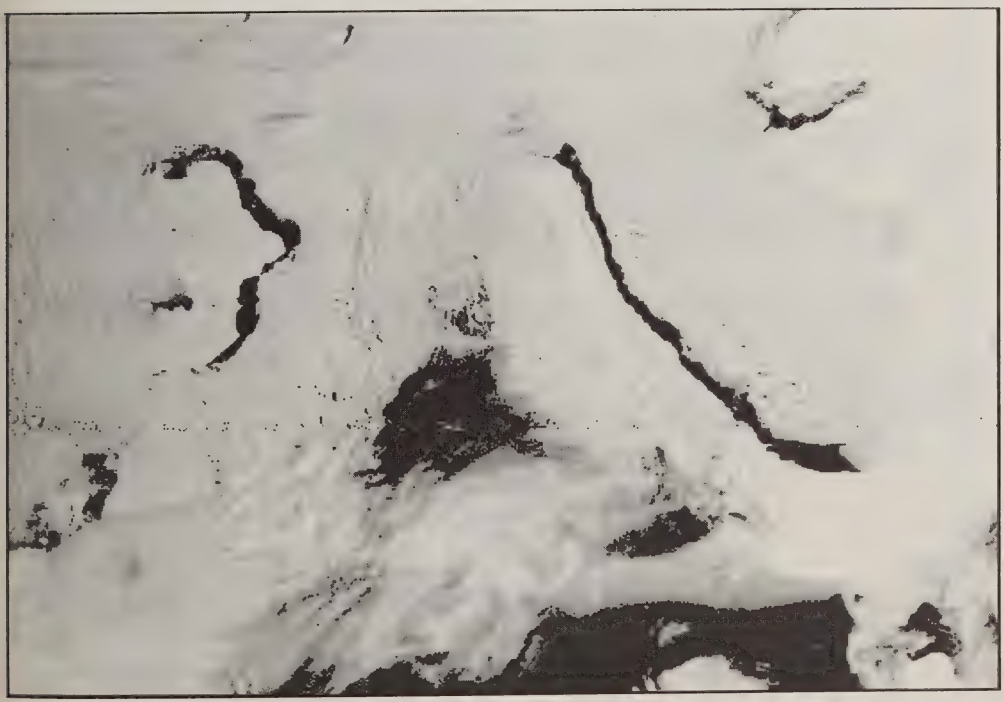
The Images on the Following Pages

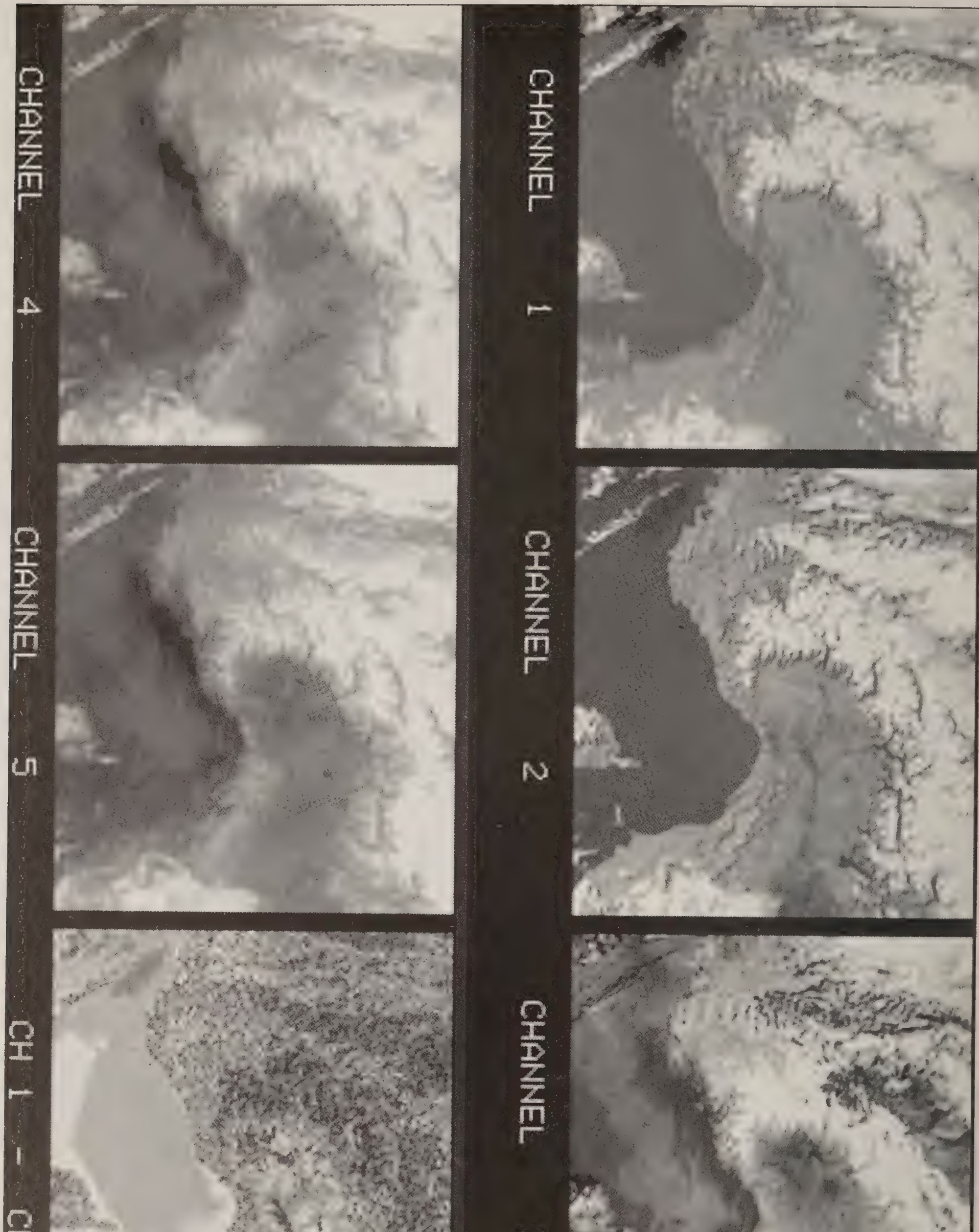
The NOAA 13 APT image at the top of page 83 was received by P Williamson shortly before it failed. Channel 2, on the left and part of the channel 1 image are reproduced here and clearly show eastern Australia.

Below, is an image received from a Meteor by Ulf Jander in Sweden on 16 April 1990 showing Franz Josef Land and Novaya Zemlja. Note how the wind has blown the ice away from the land.

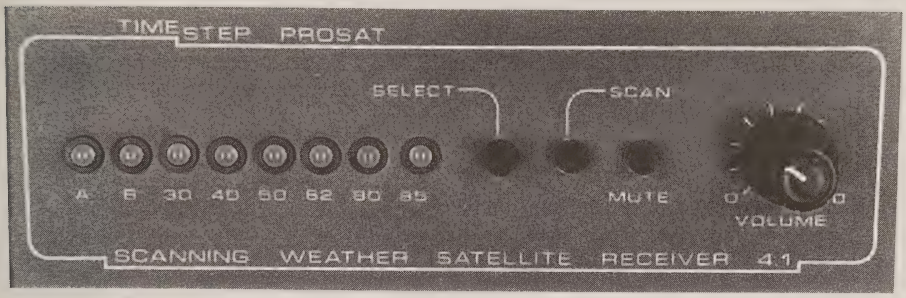
On page 84 is a composite of the different channels received from NOAA 11. Image by Peter Hayes. ●






CHANNEL 1
CHANNEL 2
CHANNEL 3
CHANNEL 4
CHANNEL 5
CH 1 - CH 2

RIG-TIMESTEP PROscan POLAR RECEIVER



A professionally made scanning receiver covering all NOAA and Soviet Polar Orbiting Satellites. The frequency can be readily seen via an LED on the front panel and unwanted channels can be locked out. It is designed with a lot of internal filtering, making it ideal for locations that suffer from Pager problems. It is resistant to pager interference at 1 to 2 miles (where the field strength is at maximum), and also carries an unconditional money back guarantee. *See RIG32 page 88 for further details.*

For the latest prices of the above equipment see Rig Shop Corner

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METEOSAT / NOAA HRPT

New from Hansen Funksysteme, this superbly engineered system provides an alternative to those seriously looking at receiving hi-res digital images - and at very attractive prices. As you would expect, this German system offers really excellent performance at realistic cost.

Designed to run on a 286, 386 or 486 machine, and catering for a variety of graphics cards, the first notable feature of this system is that the **same interface card and software package is used for both NOAA HRPT and Meteosat PDUS.** The software offers a comprehensive range of features, including animation, temperature readout, and antenna tracking (for NOAA)!

Main Features:

- ❑ Single Receiver for both HRPT & PDUS
- ❑ Single Interface & Software for HRPT & PDUS
- ❑ Decodes full 10-bit data
- ❑ 256 Colours, with up to 1024 x 768 Screen Resolution
- ❑ Colour palettes and local Gamma Correction
- ❑ Images can be saved in GIF Format
- ❑ Reception and Display of all PDUS formats with Autosave
- ❑ Scrolling, Zooming, Gridding, Colouring
- ❑ Animation of any format with actual graphics resolution
- ❑ Easy to drive Pull-down and Pop-up menus

Special NOAA-HRPT Features:

- ❑ Orbital prediction and Tracking program included
- ❑ Reception of all channels (2 x vis, 3 x I.R., Telemetry, TIP data)
- ❑ Gridding and display of city names. Long and Lat calculation
- ❑ Direct temp. readout from mouse cursor to 10-bit resolution

Hardware:

Receiver - A nicely finished unit with large backlit LCD Display, and microprocessor-controlled synthesiser. Like the interface and software, the receiver caters for both NOAA-HRPT and Meteosat-PDUS transmissions, with auto-switching I.F. bandwidths, and PCM/PSK demodulators. It connects directly to the interface card in the PC, from where it derives its power. There are two separate inputs; one for 137 - 150MHz (if using an external downconverter), and a 1.7GHz input (if coming directly from a dish/LNA).

Interface Card - Fits internally into a standard 16-bit ISA slot, and resolves both the NOAA-HRPT signals (665kBits/s) and Meteosat-PDUS (166kBits/s). Contains complete bit synchroniser, frame synchroniser, and DMA logic for fast 16-bit data transfer into PC RAM. An internal and external lock indication is provided. Frame sync. function upgrades are possible through the use of PLDs.

Rotator Interface For control of motorised dish, this neat, enclosed interface unit connects directly to the PC's parallel port (LPT1 or 2). Unit features microprocessor control, and watch-dog timer for maximum security. Driver software for Instantrack and Quicktrack (AMSAT).

Minimum PC Requirements Data rates, and storage requirements are considerably higher than with secondary systems - especially for NOAA-HRPT. Therefore we recommend the following:-
PDUS - 286,386,or 486 running under MSDOS. Memory - 6Mb EMS
HRPT - 386+387, or 486, at >20MHz running MSDOS. H'drive with maximum 19mS access time.

Prices :			
PDUS/HRPT Receiver	**£778**	**1.7GHz LNA**	**£149**
PDUS/HRPT Interface & Software	**£449**	**Demo Disks (2)**	**£5**
Rotator Interface	**£123**		

Prices exclude VAT and carriage

APT / WEFAX Imaging Systems

JVFAX Interface For those hundreds of you out there who have sampled the excellent JVFAX 6.0 software from Eberhard Beckashof, we offer this superb interface to do it justice. Full data sheet is available from us for the asking, but basically it supports APT/WEFAX, FAX, and SSTV receiver modes. The compact module features a dual microprocessor design, with separate inputs and individually optimized filter sections. **£78 + £4 p&p**

Special Introductory Offer till June 30th - £60 + £4 p&p

Latest version of JVFAX Software £2.50

Amigasat 3.1 The Amigasat package, like the Amiga, continues to go from strength to strength, with this new version fully supporting Commodore's 256 colour AGA graphics. Remember, if you've got an earlier version you can always upgrade to the latest for a modest sum. Amigasat remains the only package to reliably decode the digital headers from Meteosat for truly automatic reception. For a more comprehensive description of version 3.1 see our ad. on p74 of RIG36. **£139.95 + £4 p&p**

MSC30 Downconverter Our policy of continuous development ensures that the MSC30 Downconverter remains the finest you can own: Features include very low noise figure, high gain, buffered output for driving long cables, and good temperature stability. In addition, the MSC30 can be powered either by conventional 3-wire system or via the coax feed. High quality N-type input, BNC output, and housed in an IP65 sealed diecast enclosure. Comes complete with N-type/N-type cable, connectors etc. **£170 + £4 p&p**

MSD30 Dish A 95cm prime focus dish, of spun aluminium. Complete with MSF30 feed & heavy-duty ground stand. Gain - 22dB **£149.50 + £18 carr. & ins.**

MSF30 Feed Our popular 1.7GHz dipole feed for Meteosat, GOES, and GMS **£44 + £3 p&p**

MSR40B Receiver Micro-controlled, synthesized scanning receiver for polar and Meteosat reception. See p75 RIG36 for full description of this high performance receiver. **£295 + £5 carr. & ins.**

MSQ20 Quadrafilar VHF Antenna. Very compact - ideal for boats and sensitive sites **£48 + £5 p&p**

with integral preamp **£64 + £5 p&p**

MSA20 Turnstile VHF Antenna. Comes with 20m cable and BNC terminated **£36.50 + £5 p&p**

MSL30 1.7GHz LNA Professional-quality low noise amplifier using HEMT GaAsFET first stage, and housed in sealed diecast housing. Has N-type input and output connectors, and power is provided via the output feed. N_f = 0.7dB, A_V = 28dB min. (other gains to order) **£134 + £4 p&p**

MSK30 137MHz Preamp A new design, offering low noise and wide dynamic range. The gain can be set by adjusting the supply voltage via the feed cable from 4v - 12v, to give A_V = 5dB - 22dB. Nf = 1dB **£18 + £2 p&p**

Ordering Information

U.K. and E.U. customers add 17.5% VAT to above prices.
Overseas customers will be charged carriage at cost.
Payment may be made by cheque, postal order, or Visa, Access, and Mastercharge Cards.

martelec *communication systems*

The Acorns, Wyck Lane, East Worldham, Alton, Hants. GU34 3AW, U.K. Tel/Fax (44) 0420 82752

Timestep

** SUMMER news from Timestep **

PDUS is looking up, the latest news is that a "limited set of data will remain un-encrypted", to celebrate this we have reduced the price of the complete system (only for a while !). Even later news is that encryption could be delayed, possibly indefinitely ! If you look at our price list you will see that we have cut a massive £400.00 off the system, this offer will not last though. Call for a new colour brochure.

HRPT is going really well in the U.S.A. but not here, so to encourage you to use our 10 bit, 5 band, 1.1Km resolution, software, we have reduced the price of the complete system (UK RIG members only). We have cut a massive £400.00 off the system for a short time only. Call for a new colour brochure.

LANDSAT images with stunning 30 metre resolution are available from us now. Anywhere in England and Wales is available in 30 x 30 kilometre data sets. Call for a new colour brochure.

Postcards

By popular request we are now selling high quality postcards that will make the point to your friends, that remote sensing is more than just a hobby. Actually most people buy a set to pin to the wall !

Earth 18 stunning images of the earths surface, 4 whole earth images, lot's of Landsat of the UK; just brilliant ! £6.00
Space Stars, galaxies, man on the moon, rocket launchers and more, 20 in total at £5.00 the set.
Planets 10 images of the Planets, from NASA and other sources, only £3.00 the set.

Communications

US Robotics Sportster 14,400 modem including cable (as used by Timestep)	£199.00 (inc VAT !)
Procomm Plus DOS Software	£ 89.00 (inc VAT !)
Procomm Plus Windows software	£ 99.00 (inc VAT !)

Image Processing

All below inc VAT

Multispectral View II including an image of your choice from England or Wales	£199.00
24 bit video card	£ 89.95
Satview CD ROM 350 GIF weather satellite images	£ 19.95
500Mb of Spot from all over the World CD ROM	£ 99.00

Meteosat PDUS

1.6M dish (inc. patio mount and dish feed)	£399.00
Dish feed (included with the dish above)	£ 49.00
P-HEMT Preamplifier	£255.00
20M cable	£ 20.00
Extra 20M cable and line amplifier	£ 70.00
2 channel PDUS receiver	£499.00
PDUS PC/AT card and full software inc **colour animate**	£199.00

NOAA HRPT

90cm dish, dual feed, all metal work and galvanised ground stand	£299.00
90 degree combiner and cables	£125.00
Yaesu R5400 Az-El rotator	£499.00
25M control cables and heavy duty connectors pre-fitted must be ordered at the same time as the Az-El rotator	£125.00
Tracking card and software for automatic operation	£299.00
P-HEMT Preamplifier	£255.00
20M signal cable	£ 20.00
Extra 20M signal cable and line amplifier	£ 70.00
6 channel (5 fitted) HRPT receiver	£499.00
HRPT PC/AT card and full **10 bit** software	£199.00
Dish feed (dual polarity, for your own dish)	£ 59.00

All prices **include VAT** at 17.5% and carriage in Britain. Visa and MasterCard credit cards taken on orders over £25.00.

Timestep PO Box 2001 Newmarket CB8 8XB
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NORTHERN BALTIC SEA

This is JERS-1 image of the Straits of Messina and the Mount Etna volcano (Southern Italy) was acquired at the Fucino Ground Station on 22 June 1992 and processed by ESA/ESRIN, Frascati (see page 82).